

AD 747265

NOLTR 72-18

A METHOD AND DATA-REDUCTION TABLES
FOR DETERMINING THE RESOLUTION OF
CAMERA SYSTEMS UNDER TYPICAL FIELD
CONDITIONS

By
Carl M. Franz

20 JUNE 1972

DDC
RECEIVED
A

NOL

NAVAL ORDNANCE LABORATORY, WHITE OAK, SILVER SPRING, MARYLAND

Approved by
NATIONAL TECHNICAL
INFORMATION SERVICE
U.S. Department of Commerce
Springfield, VA 22161

APPROVED FOR PUBLIC RELEASE;
DISTRIBUTION UNLIMITED

NOLTR 72-18

UNCLASSIFIED

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) Naval Ordnance Laboratory Silver Spring, Maryland 20910		2a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED	
		2b. GROUP N/A	
3. REPORT TITLE A METHOD AND DATA-REDUCTION TABLES FOR DETERMINING THE RESOLUTION OF CAMERA SYSTEMS UNDER TYPICAL FIELD CONDITIONS			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) FINAL			
5. AUTHOR(S) (First name, middle initial, last name) Carl M. Franz			
6. REPORT DATE 17 January 1972	7a. TOTAL NO. OF PAGES 73	7b. NO. OF REFS 2	
8a. CONTRACT OR GRANT NO.		9a. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO. GRIFFISS AFB MIPR No. F30602-71-X-0003		NOLTR 72-18	
c.		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.		NONE	
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES NONE		12. SPONSORING MILITARY ACTIVITY Rome Air Development Center Griffiss Air Force Base Rome, New York 13440	
13. ABSTRACT A system is described for evaluating the resolving power of photographic and other optical systems under test conditions typical of their everyday use. The test data thus obtained reflects the effects of atmospheric haze, mount stability, operator focusing error, etc. The 40 x 42 inch test targets, which are based on the "USAF-1951" design, consist of resolution groups "minus six" through "minus one" with line widths varying from 0.56mm through 32mm. To facilitate the analysis of tests performed with the above targets, an extensive set of computer-generated Resolving Power Data Reduction Tables is presented in Appendix C. These tables permit rapid and accurate determination of image plane resolution of camera systems using lens focal lengths from 10mm through 2000mm. Data is provided for twelve selected object distances for each of 48 lenses. A second set of 192 tables enables resolution to be determined for any optical system producing an image magnification between 0.034621 and 0.000139. The selection and use of these latter tables are based solely on the size of the target image; the lens focal length and object distance need not be known. Three examples illustrating typical applications of the resolution targets and data reduction tables are presented. The references in this publication provide the background necessary for the inexperienced user to make full use of the resolving power tests provided in this report.			

DD FORM 1473 (PAGE 1)

S/N 0101-807-5201

UNCLASSIFIED

Security Classification

14 KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
LENS TESTING LENS RESOLUTION CAMERA SYSTEM TESTING PHOTOGRAPHIC TEST TARGETS IMAGE EVALUATION RESOLUTION TARGET						

NOLTR 72-18

NOLTR 72-18

17 January 1972

A METHOD AND DATA-REDUCTION TABLES FOR DETERMINING THE RESOLUTION OF
CAMERA SYSTEMS UNDER TYPICAL FIELD CONDITIONS

This report describes a method and presents data reduction tables for use in evaluating the resolution of camera systems under test conditions typical of field use. The test method and data reduction tables were developed by the Photographic Division of the Engineering Services Department of the Naval Ordnance Laboratory (NOL), as part of the "High Acuity Experimentation II" program, which was conducted for Rome Air Development Center, Griffiss Air Force Base, Rome, New York. (MIPR No. F30602-71-X-0003).

The author wishes to thank Mrs. Mary Lou Blessing, of the Computer Applications Division of the Mathematics Department, for writing the computer program which produced the data tables. The author also wishes to thank Frank Pierce of the Publications Division for his editorial assistance in the preparation of this report.

ROBERT WILLIAMSON II
Captain, USN
Commander


E. H. LANGENBECK
By direction

CONTENTS

	Page
INTRODUCTION	1
BACKGROUND	1
DETERMINATION OF CAMERA SYSTEM QUALITY USING DATA REDUCTION TABLES	2
RESOLVING POWER TARGET DESIGN.	2
DATA REDUCTION TABLES: DESCRIPTION	6
SECTION (A) NOMINAL DIMENSIONS OF RESOLVING POWER TEST TARGETS	6
SECTION (B) RESOLVING POWER DATA TABLES FOR SPECIFIC LENS FOCAL LENGTH/OBJECT DISTANCE COMBINATIONS	6
SECTION (C) TABULATION OF CAMERA SYSTEM MAGNIFICATIONS AND RESULTANT IMAGE SIZES.	8
SECTION (D) RESOLVING POWER DATA TABLES FOR SPECIFIC CAMERA MAGNIFICATIONS	8
APPLICATION OF LARGE SCALE RESOLUTION TARGETS.	9
REFERENCES	12
APPENDIX A - DESCRIPTION OF COMPUTER PROGRAM	A-1
APPENDIX B - COMPUTER PROGRAM.	B-1
APPENDIX C - DATA REDUCTION TABLES	C-1

ILLUSTRATIONS

Figure	Page
1 Large-Scale Resolution Target	3
2 Resolution Group Minus Six Showing Applicable Terminology	4
3 Determination of Object Space Resolution (Typical Example).	10

INTRODUCTION

Resolving power tests have long been used to assess the image quality of photographic systems under laboratory conditions. In an effort to apply the principles of laboratory-type resolving power tests to field testing of complete photographic systems, the Naval Ordnance Laboratory, White Oak, has prepared large-scale resolution targets suitable for use at distances typical of those encountered under field conditions. Although the method by which resolving power test imagery is translated into quantitative data is fairly simple, preparation of data from large quantities of these tests involve numerous time-consuming calculations. To simplify this task, the Laboratory has also prepared a set of computer-generated data reduction tables which are based on the associated large-scale resolution targets.

These data reduction tables can be used to determine the resolving power of camera and other optical systems under actual field conditions. They are also useful to the optical metrologist for designing resolution experiments. The purpose of this report is to explain the use of the data reduction tables, to provide the background by which they were developed, and to suggest possible applications.

The reader who has not had prior experience in performing resolving power tests (such as work with an optical collimator, National Bureau of Standards (NBS) targets at 21 focal lengths, etc.) should familiarize himself with two publications: A Method of Determining the Resolving Power of Photographic Lenses, NBS Circular 533 (available from Superintendent of Documents, Government Printing Office (GPO), Washington, D.C.); and MIL-STD 150A, Photographic Lenses (also available from Superintendent of Documents, GPO, Washington, D.C.).

BACKGROUND

Under a contract with Rome Air Development Center, Griffiss Air Force Base, Rome, New York, (entitled High Acuity Experimentation II, MIPR No. F30602-71-X-0003) the Photographic Division of the Naval Ordnance Laboratory investigated the performance of a number of popular 35mm still cameras. A major portion of the investigation was to quantitatively determine typical field performance, reflecting the effects of atmospheric haze, mount stability, and operator variability among other factors. It was decided to use resolving power tests as the primary means of evaluation because of their simplicity, ease of evaluation, and because the overall program concerned the recording of threshold-quality imagery.

Normally, resolution tests are run under carefully controlled conditions at either relatively close distances or with the aid of an optical collimator. Provisions are made for eliminating camera vibrations and other effects which might degrade the quality of the data.

The test conditions used to determine typical field performance are considerably different, however. For the purposes of the NOL field testing program, the resolution targets had to be suitable for a wide range of conditions, including use with focal lengths of 35 to 1400mm and object distances in excess of one mile. A search was made to locate a suitable off-the-shelf target, but when none could be found, a large-scale resolution target based on the USAF 1951 Design was prepared (see Figure 1). Its 40 x 42 inch size (including margins) permits easy carriage and mounting in field use but it is large enough to be used at typical object distances. The largest resolution pattern can be detected with a 135mm lens at 2000 feet with an effective camera-system resolving power of 72 lines per millimeter.

DETERMINATION OF CAMERA SYSTEM QUALITY USING DATA REDUCTION TABLES

After making a series of negatives of the resolution target and determining the smallest resolvable target on each negative by means of a 30-to 40-power microscope, one would normally compute the image plane resolution using the width of the target bar, the lens focal length, and the object distance. To simplify this task, data reduction tables (provided as Appendix C) have been prepared and especially keyed to the NOL large-scale test target. These tables facilitate direct and rapid determination of the image plane resolution for 48 lens focal lengths of 10 through 2000mm, at each of 12 typical object distances. A second series of tables allows determination of system resolution when the object distance and focal length are either unknown or are not listed in the tables. In either of these latter situations, the user selects a table based on system magnification determined by measuring the actual image size of the target as recorded on the film.

RESOLVING POWER TARGET DESIGN

The NOL large-scale resolution target is based on the design of the "USAF-1951" resolution target. The NOL target (Figure 1) consists of 36 target elements decreasing in spatial frequency as the sixth root of two ($\sqrt[6]{2}$) (approximately 12 percent). The geometric design of the target elements and associated terminology are presented in MIL-STD 150-A. A standard target element consists of two patterns (two sets of lines) which are oriented at right angles to each other as shown in Figure 2. Each pattern in turn consists of three bars and two included spaces, all of equal width. The length of the bars is five times the bar width. A bar or a space is referred to as an interval, while the combination of a bar and a space is referred to as a unit. The unit width is used to compute the spatial frequency of the pattern.

To facilitate the microscopic examination of the test imagery, the 36 elements are organized into sets of six, each set being referred to as a group. Figure 2 illustrates a single target group. The NOL

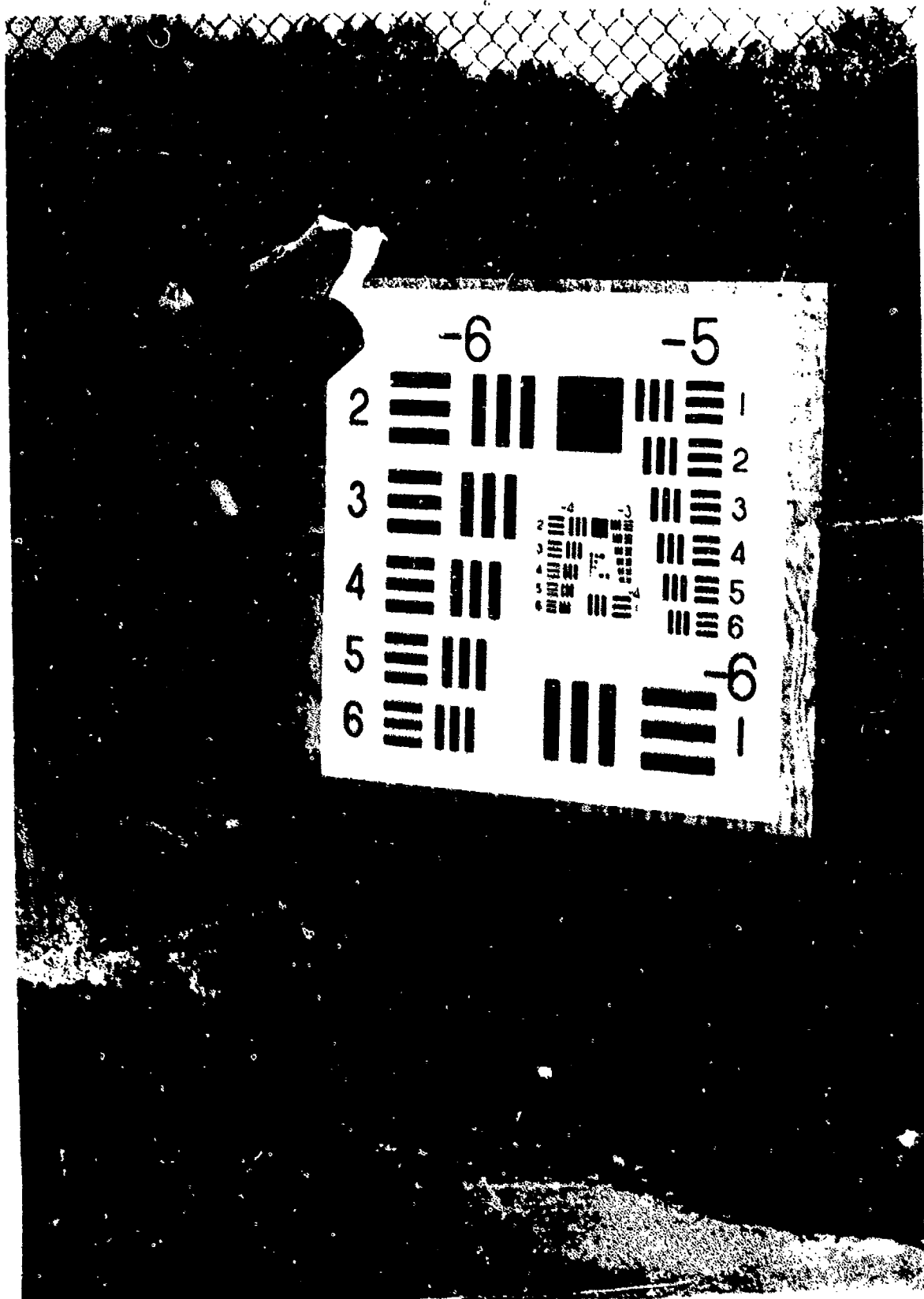


FIG. 1 LARGE-SCALE RESOLUTION TARGET

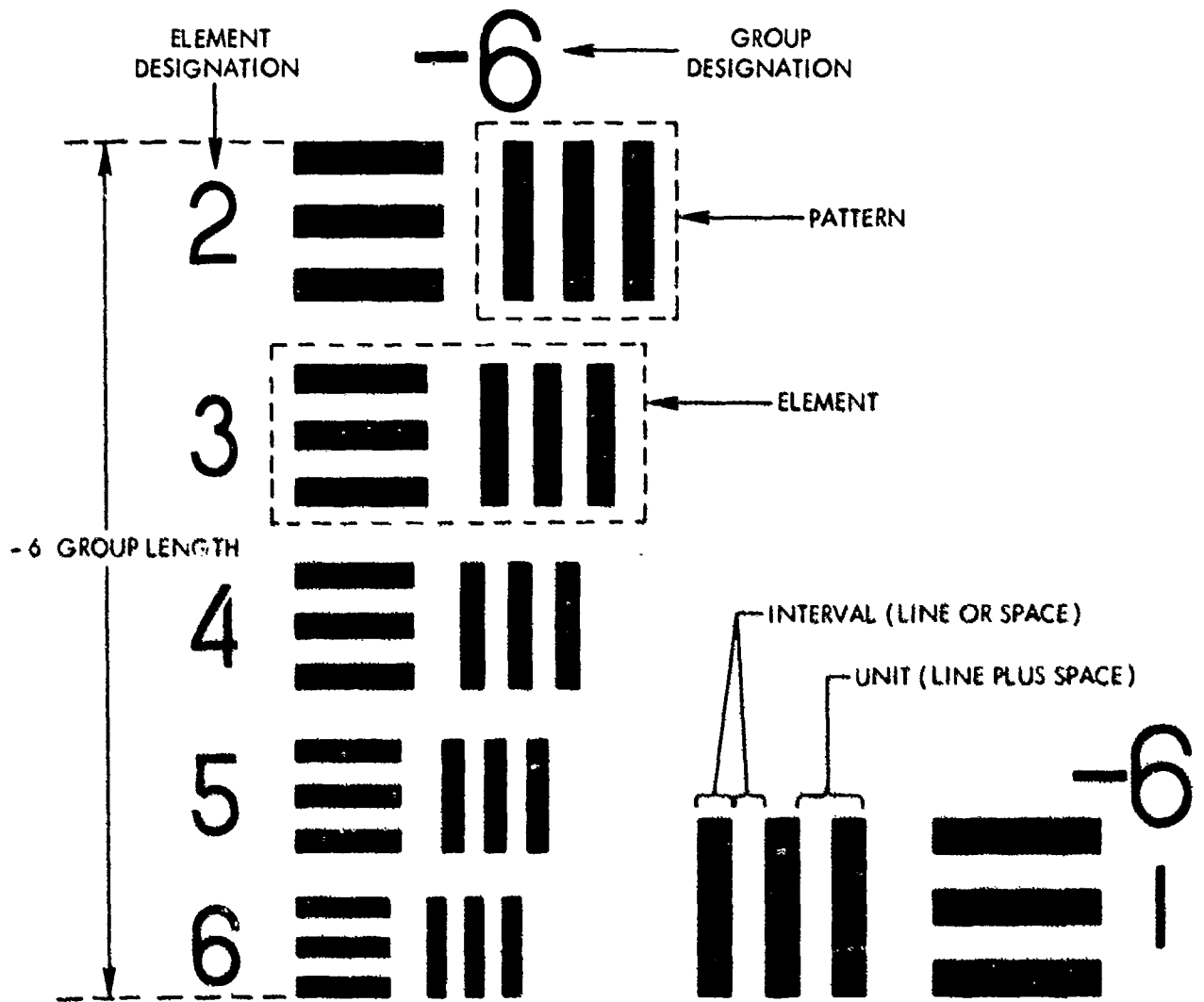


FIG. 2 RESOLUTION GROUP MINUS SIX SHOWING APPLICABLE TERMINOLOGY

target consists of groups "minus six" (-6) through "minus one" (-1). Each group in turn consists of six elements. The group number indicates, in terms of powers of two, the number of lines per millimeter of the largest pattern within the group:

$$\text{Resolution} = 2^K$$

where K is the group designation.

For example, in group "minus three":

$$R = 2^{-3}$$

$$R = \frac{1}{(2)^3}$$

$$R = 1/8 = 0.125 \text{ Lines/mm}$$

The resolution of any pattern can be computed using the formula:

$$R = 2^{K + \frac{N-1}{6}}$$

where K is the group designation and N is the element designation.

The targets were prepared using two techniques. A full size 40 x 42 inch high contrast negative was made on polyester-based lithographic film using a process camera and a smaller format master. This negative was then used to make contact prints on resin-coated (dimensionally stable) photographic paper. Contact prints were made at three levels of contrast. The contrast ratios and density differences of the target lines and spaces were as follows:

High Contrast -	100:1	(ΔD = 2.00)
Medium Contrast -	6.3:1	(ΔD = 0.80)
Low Contrast -	1.6:1	(ΔD = 0.20)

All targets consisted of dark lines on a light background.

Although very satisfactory, photographic targets were expensive to make due to the time required to accurately assemble the matrix of prints into a 40 x 42 inch target. A second set of relatively inexpensive targets was prepared by printing the targets on heavy card stock using offset lithography. These targets, 40 inches high by 42 inches wide, including margins, were produced in high contrast only, having black lines on a white background. The array of resolution patterns (excluding the element and group designations) is approximately thirty inches square.

The Graphic Arts Research Center of Rochester Institute of Technology, Rochester, New York, 14623, is planning to market large-scale resolution targets similar to those described in this report. The targets will be printed on both paper and card stock in high, medium, and low contrast.

DATA REDUCTION TABLES; DESCRIPTION

The Data Reduction Tables* which are included in this report as Appendix C consist of four sections, as follows:

- Section (A) Nominal Dimensions of Resolving Power Test Target;
- Section (B) Resolving Power Data Tables for Specific Lens Focal Length/Object Distance Combinations;
- Section (C) Tabulation of Camera System Magnifications and Resultant Image Sizes;
- Section (D) Resolving Power Data Tables for Specific Camera Magnifications.

A description of each section is provided below:

(A) NOMINAL DIMENSIONS OF RESOLVING POWER TEST TARGET. This single-page section presents the nominal dimensions of the interval widths and unit widths of elements one through six of groups "minus six" through "minus one". Dimensions are given in terms of inches as well as millimeters. The data reflects the theoretical design goals; the actual dimensions on the targets vary from these values due to limitations of the reproduction process. Definitions are presented for pertinent terminology.

(B) RESOLVING POWER DATA REDUCTION TABLES FOR SPECIFIC LENS FOCAL LENGTH/OBJECT DISTANCE COMBINATIONS. This section contains data reduction tables for 48 lens focal lengths at each of 12 selected object distances. The lens focal lengths presented range from 10mm to 2000mm. The 12 object distances vary depending on the lens focal length. (The tables for 35mm lenses range from 10 feet to 400 feet, whereas the tables for 1000mm lenses range from 150 feet to 5000 feet.) Above each data table is a four-line heading containing the following information:

- Lens focal length in millimeters;
- Object distance in feet and meters;
- Image magnification;
- Size of image in millimeters and inches.

*A description of the computer program used in generating the data reduction tables and the program itself are provided in Appendices A and B.

Each data table consists of a six-by-six array of resolution values. The vertical columns denote groups "minus six" through "minus one", while the horizontal rows denote the elements.

The resolution values, which are presented in terms of lines-per-millimeter, represent computed theoretical data, not test data. The data presented in the tables is independent of the quality of the optical system under evaluation. The quality of the optical system comes into play by determining the smallest target which is resolved. For a given lens focal length and object distance, a quality system may resolve the "minus four" group, "element three" target, (79.9 lines per millimeter); whereas a poorer system might resolve only the "minus five" group, element two target, (35.6 lines per millimeter).

Tests using a focal length/object distance combination not explicitly listed can often be readily evaluated by applying a simple factor to one of the existing tables. As an example, there is no table presented for evaluation of a 75mm lens at 750 feet. To compute the resolution of this combination, one refers to the 150mm/1500-foot table. The resolution value may be read directly from the table because the computed data for a 75mm lens at 750 feet would be identical to that provided for the 150mm lens at twice the distance. As long as the ratio of focal length to distance remains the same (e.g., 250mm at 1000 feet vs 1000mm at 4000 feet, etc.), the results can be read directly from any analogous table. This type of substitution does not result in any error.

If no ratio extension is available, another method may be employed. For example, data is not presented for evaluating a 135mm lenses at 125 feet and no multiples of the 135mm focal length are presented. However, a table does present data for 135mm lenses at 250 feet. Although the ratio is not the same, a resolution value can be approximated by reference to the 250-foot table and multiplying the value by two. This multiplication compensates for the two-to-one ratio of the object distances. Performance values determined by this method will generally be accurate within one percent. This is not a significant error considering that the selection of the target image resolved involves a choice of elements which vary by 12 percent.

To simplify the format of the data tables, all computed resolution values which are equal to or exceed 1000 lines per millimeter are given as 999.9.

The tables presented in Section B can be used to good advantage by anyone designing resolution experiments. If the object distance which is selected for a particular test is too short, all targets will be resolved and the test would yield no data. Conversely, if the distance is excessive, none of the targets will be resolved. The following procedures can be followed to eliminate these situations however:

1. Make an estimate of the number of lines per millimeter which can be resolved by the system. Past experience with the film/lens/camera combination is a good guide.

2. Refer to the page containing the lens focal length to be tested.

3. Scan the tables to locate a table based on any convenient object distance which lists the estimated system performance in groups "minus two" through "minus five." Groups "minus one" and "minus six" are for safety margins only and should not be used in determining the test distance.

As an example, consider a system which has an estimated resolving power of 80 lines per millimeter. If the test is to be performed at an object distance which lists 80 lines per millimeter at group "minus five," "element three." If the actual resolution of the system is only 40 lines per millimeter, a target will still be available to provide the data. In this case, it would be the group "minus six," "element three," target which the table indicates is equal to 40 lines per millimeter. Had we selected the distance where 80 lines per millimeter was listed at "minus six," "element three," no target would be resolved.

(C) TABULATION OF CAMERA SYSTEM MAGNIFICATIONS AND RESULTANT IMAGE SIZES. In some testing situations, the object distance, focal length, or both will be unknown. A determination of system resolution can still be made under these conditions by determining the image size of the target on the resulting test film. This measurement, referred to as the "-6 Group Length," will then allow the selection of an appropriate data table.

A traveling-stage microscope or other suitable instrument can be used to measure the length of the "minus six" group from the top of its second element to the bottom of its sixth element (Figure 2). The measurement may be in millimeters or inches, whichever is more convenient.

Turning to the "-6 Group Length" table (Section C of Appendix C), one then scans the appropriate inch or millimeter column to locate the entry closest to the measured value. The corresponding value of magnification can be read from the adjacent column. The tabulation of values in this table range from a magnification of 0.000139 to 0.034621 and vary with the 24th root of $2(\sqrt[24]{2})$. Using the selected magnification value, one can refer to Section D which provides image plane resolution tables by magnification rather than by focal length and object distance.

(D) RESOLVING POWER DATA TABLES FOR SPECIFIC CAMERA MAGNIFICATIONS. Format and use of these tables are identical to those in Section B of Appendix C. System resolutions are determined from these tables in the manner previously described. Note that each table is valid for any system which produces the stated image size and magnification, regardless of the specific focal length and object distance used.

APPLICATIONS OF LARGE-SCALE RESOLUTION TESTS

There are numerous practical applications for large-scale resolution targets. Three typical examples are discussed below.

Example 1

Large-scale resolution targets allow photographic and other optical systems to be tested under conditions which are typical of their everyday applications. As such, these tests provide a quantitative measurement of the effectiveness of the system under the conditions normally encountered during actual use.

The data gathered by these tests reflect the effects of atmospheric haze and shimmer, focusing accuracy, camera mount stability, etc. In many applications, these degradations are the dominant factors in determining the performance of the system.

Example 2

It is frequently worthwhile to compare actual field tests with reference or "control" tests (laboratory tests of the same equipment, or field tests made under more stringent conditions). Comparison tests of this type can reveal (1) the percentage of resolution loss due to atmospheric haze, (2) the minimum shutter speed which can be used to hand-hold a long lens while still maintaining a desired level of resolution, (3) the minimum shutter speed required when photographing a moving object, or (4) the stability of one tripod versus another.

The comparison of the two test conditions can identify that point (a minimum shutter speed for example) where field data is not degraded with respect to control data, or it can be used to indicate percent resolution loss of field tests versus control tests.

Example 3

Large-scale resolution tests can be used to assess the object space resolution* of pictorial imagery. This technique was utilized in a recent NOL investigation which was concerned with determining the minimum image quality requirements necessary for identification of people. Typical results of increasing image quality and the associated increase in certainty of identification are shown in Figure 3.

This problem area was divided into three levels of pictorial quality:

*Object space resolution: The spatial frequency of the target or the width of the target bar which is resolved in the photographic record.

25'
TARGET RESOLVED:
GROUP "2" ELEMENT "4"
LINE WIDTH 1.41 MM (0.055")



MAGNIFICATION • 11X

50'
TARGET RESOLVED:
GROUP "3" ELEMENT "3"
LINE WIDTH 3.18 MM (0.125")



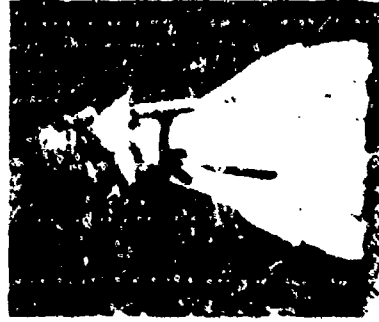
MAGNIFICATION • 22X

100'
TARGET RESOLVED:
GROUP "4" ELEMENT "3"
LINE WIDTH 6.35 MM (0.250")



MAGNIFICATION • 44X

200'
TARGET RESOLVED:
GROUP "5" ELEMENT 4
LINE WIDTH 11.31 MM (0.445")



MAGNIFICATION • 88X

SHOWN ARE MATCHED PHOTOGRAPHS OF A MODEL AND A LARGE-SCALE RESOLUTION TARGET, PHOTOGRAPHED AT FOUR REPRESENTATIVE DISTANCES FROM 25' TO 200'. THE FOUR PHOTOGRAPH PAIRS ARE FROM A SET OF 14 PAIRS MADE AT DISTANCES FROM 20' TO 400' TO DETERMINE THE MINIMUM OBJECT-SPACE RESOLUTION WHICH WOULD ALLOW IDENTIFICATION OF AN INDIVIDUAL.

CAMERA: 35 MM BESSLER TOPCON SUPER D
LENS: 58 MM AT f/11
IMAGE PLANE RESOLUTION, ALL FRAMES:
46 LINES/MM $\pm 12\%$ (± 1 ELEMENT)
FILM: TRI-X

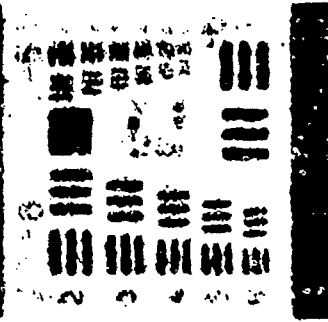
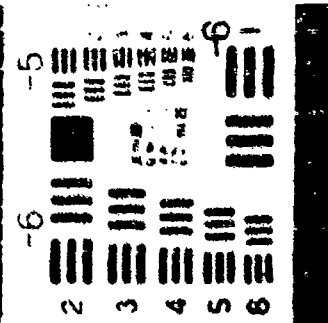
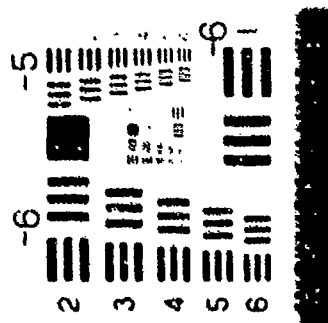
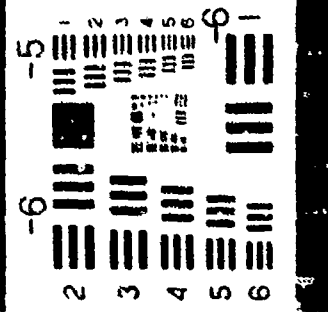


FIG. 3 DETERMINATION OF OBJECT-SPACE RESOLUTION

NOLTR 72-18

- (1) Personnel Detection: To differentiate personnel from the adjacent background and to count the number of people present in the photograph;
- (2) Personnel Recognition: To provide general descriptions of the personnel present in a photograph, i.e., sex, height, weight, hair color and length, presence of glasses, etc.; and
- (3) Personnel Identification: To identify beyond reasonable doubt the presence of a specific individual.

To meet each one of these standards successively, an increasing improvement in pictorial quality is required.

An experiment was performed to determine the degree of object space resolution required for the above levels. Using a 58mm lens and Tri-X film, a group of five people and a large-scale resolution target were photographed at 14 separate distances, varying from 50 to 2016 feet.* The resulting film was then analyzed to determine the smallest resolvable target at each distance. The width of the selected target bars was a direct measurement of the object-space resolution present in each negative. (Note that previous examples have been concerned with lines per millimeter on the film; here we are concerned with the minimum size of the actual target lines which were successfully recorded.) A set of 40X enlargements was then produced. These prints were then examined by several qualified interpreters to determine the lowest level of pictorial quality which could be tolerated and still enable the interpreter to extract the information at the three required levels. (Although final conclusions have not been made, it appears that an object-space resolution of 1/8 inch is necessary if one is to meet the "personnel identification" criteria.)

Other Applications

The NOL large-scale resolution targets and associated data reduction tables can also be used to evaluate night vision devices, surveyor's transits, telescopes, binoculars, and a variety of other optical devices under field conditions.

*For this experiment, a second set of data reduction tables were prepared similar to those in Appendix C. The 24 object distances per lens focal length varied with the $\sqrt[3]{L}$; e.g., 100, 126, 159, 200, 318 feet, etc.

REFERENCES

A Method of Determining the Resolving Power of Photographic Lenses; NBS Circular 533. Superintendent of Documents, Government Printing Office, Washington, D.C.

MIL-STD 150A; Photographic Lenses. Superintendent of Documents, Government Printing Office, Washington, D.C.

NOLTR 72-18

APPENDIX A
DESCRIPTION OF COMPUTER PROGRAM

APPENDIX A

DESCRIPTION OF COMPUTER PROGRAM

The computer program used to generate the Resolving Power Data Reduction Tables is presented in Appendix B. The following description of the program's functions and its data deck structure should enable others to modify the program to generate tables for focal lengths and object distances not contained in Appendix C.

The Fortran IV program was written to present resolving power data tables for (1) given lens focal lengths and associated object distances and (2) generated magnifications. The main program acts basically as an executive calling in the various subroutines to perform computations, printing, etc.

Subroutine FOCAL computes the image magnification, "-6 Group Length," and resolving power data for a given focal length and object distance. The resolving power for group "minus six," "element one" of each table (referred to in program as "result") is computed from the above variables, the remaining data in each six-by-six array is arrived at by multiplying the "result" by each of 35 stored constants. This routine also stores the resolution data along with the test conditions, magnification, and "-6 group length".

Subroutine GENER generates a series of magnification values based on chosen (by data card) limits and power of two.

Subroutine MAGNIFY computes the resolving power data tables for the generated magnifications values.

Subroutine IMAGPRT prints the tabulation of generated magnification values and the associated "-6 group lengths".

Subroutine HEADER prints the tabulation of nominal target dimensions, notes, and nomenclature.

Subroutine PAGPRT prints the 12 data tables per focal length and the heading above each table which lists the test conditions and associated data.

Constraints within the program limit the number of input object distances, per data card, and the number of tables per page in the output to 12. Also, the total number of magnifications at any one time during execution (either generated or computed from focal lengths) is limited to 900. It should also be noted that any resolution value equal to or in excess of 1000.0 is set to 999.9.

NOLTR 72-18

On a CDC 6400, the program required an octal field length of 31,000 during execution and required 33 seconds of central processor time to execute under the Fortran Extended Compiler.

The data deck is structured as follows:

<u>CARD NO.</u>	<u>COLUMNS</u>	<u>VARIABLE</u>	<u>DEFINITION</u>
1	1-5	N	- Number of tables per page, not to exceed 12 (Right Adjusted). To obtain 24 object distances per focal length, use two input data cards per lens.
	6-10	MAG	- Indicator of method of computation to be used: a value of minus one (-1) will produce both the focal length tables (Section B) and the magnification tables (Section D). A value of zero (0) will produce only the focal length tables; a value of plus one (+1) will produce only the magnification tables (Right adjusted).
	11-15	NF	- Total number of focal length data cards (Right adjusted).
2 through (NF+1)	1-5, 6-10 11-15---56-60, 61-65		- One focal length and up to 12 object distances (feet) per card (Right adjusted).
NF+2	1-10	XMAX	- Maximum desired value of generated magnifications (floating point).
	11-20	XMIN	- Minimum desired value of generated magnifications (floating point).
	21-30	ROOT 2	- Root of two (2) used to build magnification values (floating point). A value of 24 was used to obtain the Section D tables which vary the magnification value by the 24th root of 2.

NOLTR 72-18

APPENDIX B
COMPUTER PROGRAM


```

15      CALL XPSORT
      CHERE THE NUMBER OF TABLES NEEDED IS COMPUTED
      IF (MOD(NUMBER,N)) 65,60,65
      60      QUEN=NUMBER/N
      60      GO TO 66
      65      NUM=(NUMBER/N)+1
      66      DO 75 N=1,MUM
      66      DO 70 I=1,N
      66      IF ((I-N)*I) .GT. NUMBER ) GO TO 73
      CTHIS ROUTINE COMPUTES THE RESULT
      CALL MAGNIFY
      NNN=N
      70      DO 70 I=1,36
      70      A(I,I)=GROUP(I)*RESULT
      70      IF (A(I,I) .GT. 999.9) A(I,I)=999.9
      70      GO TO 175
      73      NNN=N+1
      73      N=I-1
      175      CALL XPSORT
      75      CONTINUE
      1800      STOP
      END
  
```

```

05  SUBROUTINE FOCAL
COMMON RESULT,LENGTH,OBJECTD(12),A(12,36),SAVE (900),SAVE1(900)
11  SAVE2(900),SAVE3(900),K,EMAX,XMIN,XOOT2,NUMBER,H,I,NF
COMMON SAVE(900)
COMMON MAG
COMMON IN
COMMON NNN
INTEGER OBJECTD
K=1
10  OBJECT=OBJECTD(I)+30.0
KIMG= (OBJECT*LENGTH)/(OBJECT-LENGTH)
MAG= XIMG/OBJECT
RESULT 01./100.0MAG)
SAVE(K)=XIMG
15  SAVE1(K)=XIMG
SAVE2(K)=LENGTH
SAVE3(K)= OBJECTD(I)
WHERE THE -4 GROUP LENGTHS ARE FORMED FROM THE MAGNIFICATIONS
20  SAVE4(K)= 703.0XMG
RETURN
END

```


HEAD1500

SUBROUTINE HEADER (GROUP)

```

05 DIMENSION GROUP(36)
   DIMENSION VI(36),VU(36),VII(36),VUI(36)
   COMMON RESULT,LENGTH,OBJECTD(12),A(12,36),SAVE (900),SAVE1(900)
   1)SAVE2(900),SAVE3(900),K,KMAX,KMIN,ROOT2,NUMBER,N,II,NF
   COMMON SAVE4(900)
   COMMON MAG
   COMMON IN
   COMMON NMN
   INTEGER OBJECTD
   IIIII=0
   PRINT 1

```

HEAD1510

```

10 1 FORMAT(1M1,////////)
   PRINT 2
15 C PRINT 3
   PRINT 4
   PRINT 5
   PRINT 6
   VUII=0.
   SVUII=0.0/25.4
   VI(1)=32.
   SVI(1)=32./25.4
90 DO 100 IL=2,34
   VII(1)=VI(1)/GROUP(1L)
   VUI(1)=2.0*VI(1)
   VII(1)=VII(1)/25.4
100 VUI(1)=VUI(1)/25.4
75 IV=1
   PRINT 8,V(IV),VII(IV),VUI(IV),VUII(IV),
   VI(IV),VII(IV),VUI(IV),VUII(IV)
   1 VI(IX),VII(IX),VUI(IX),VUII(IX)
   IV=IV+1
   PRINT 9,V(IV),VII(IV),VUI(IV),VUII(IV),
   VI(IV),VII(IV),VUI(IV),VUII(IV)
   1 VI(IX),VII(IX),VUI(IX),VUII(IX)
   IV=IV+1
   PRINT 10,V(IV),VII(IV),VUI(IV),VUII(IV),
   VI(IV),VII(IV),VUI(IV),VUII(IV)
   1 VI(IX),VII(IX),VUI(IX),VUII(IX)
   IV=IV+1
   PRINT 11,V(IV),VII(IV),VUI(IV),VUII(IV),
   VI(IV),VII(IV),VUI(IV),VUII(IV)
   1 VI(IX),VII(IX),VUI(IX),VUII(IX)
   IV=IV+1
   PRINT 12,V(IV),VII(IV),VUI(IV),VUII(IV),
   VI(IV),VII(IV),VUI(IV),VUII(IV)
   1 VI(IX),VII(IX),VUI(IX),VUII(IX)
   IV=IV+1
   PRINT 13,V(IV),VII(IV),VUI(IV),VUII(IV),
   VI(IV),VII(IV),VUI(IV),VUII(IV)
   1 VI(IX),VII(IX),VUI(IX),VUII(IX)
   IV=IV+1
   PRINT 14,V(IV),VII(IV),VUI(IV),VUII(IV),
   VI(IV),VII(IV),VUI(IV),VUII(IV)
   IF(III=0. 1) GO TO 111
   PRINT 200
   FORMAT(1M,/)
   PRINT 900

```



```

SUBROUTINE XHAGPRT
COMMON RESULT,LENGTH,OBJECTD(12),A(12,36),SAVE (900),SAVE1(900)
1)SAVE2(900),SAVE3(900),K,XMAX,XMIN,ROOT2,NUMBER,N,II,NF
COMMON MAG
COMMON SAVE4(900)
COMMON MAG
COMMON IN
COMMON NNN
INTEGER OBJECTD
1010 PRINT 1015
CTHE CONVERSION OF OBJECT DISTANCES AND - 6 GROUP LENGTHS INTO INCHES
110 DC 100 J=1, K
C
TS= SAVE3(J),*12,0*.0254
ST = SAVE4(J) /25.4
1020 PRINT 1025, SAVE(J),SAVE4(J),ST
1025 FORMAT(F13.6,F14.3,F16.6)
120 IN =IN +1
C THIS IS TO INSURE PRINTING OF 0 MORE THAN 56 LINES PER PAGE
NM=MOD(IN,56)
IF (NM.NE.0) GO TO 100
1030 PRINT 1015
100 CONTINUE
1015 FORMAT(1H1,3X,MAGNIFICATION,9X,0-6 GROUP LENGTH,10X/25X,MM,0.1
11X,0INCH)
RETURN
END

```

```

SUBROUTINE PARPRT
  DIMENSION TSAVE(900),QSAVE(900)
  COMMON RESULT,LENGTH,OBJECT(12),A(12,36),SAVE (900),SAVE1(900)
  1)SAVE2(900),SAVE3(900),K,MAX,XMIN,ROOT2,NUMBER,M,I,NF
  COMMON SAVE4(900)
  COMMON MAG
  COMMON IN
  COMMON NNN
  INTEGER OBJECTD
  X=1./25.4
  IF (MAG.EQ. 0) GO TO 1100
  C FOR MAG.NE. 0 - K REPRESENTS THE KTH MAGNIFICATION VALUE,BUT FOR MAG.EQ. 0
  C IT REPRESENTS THE PAGE NUMBER
  KLM = K+1-N
  KKL = KLM + (K-1)
  GO TO 900
  1100 KLM = (K-1)*NNN+1
  KKL = KLM + (K-1)
  DO 100 IK= KLM,KKL
  1)SAVE(IK) = SAVE3(IK) * 12.0*.0254
  QSAVE(IK) = SAVE4(IK) * X
  IF (MAG.EQ. 0) GO TO 210
  PRINT 1,LENGTH
  1)FORMAT (I1,29X,'IMAGE PLANE RESOLUTION (LINES PER MILLIMETER),FOR
  X=.15,9M FOCAL LENGTH LENSES',//)
  GO TO 260
  210 PRINT 202
  202)FORMAT (I1,44X,'IMAGE PLANE RESOLUTION (LINES PER MILLIMETER),')
  250 M = (K-1) *NNN +1
  M1=M+1
  M2=M+2
  GO TO 1500
  M1=M+1-N
  M2=M+2-N
  1500 DO 1000 I=1,M +3
  11=1+I
  12=1+2
  IF (MAG.EQ. 0) GO TO 240
  PRINT 2,LENGTH,LENGTH,LENGTH
  2)FORMAT(12(9X,'FOCAL LENGTH -',17,6M,11X),9X,'FOCAL LENGTH -',
  A,17,6M,1)
  PRINT 3,SAVE3(M),TSAVE(M),SAVE3(M1),TSAVE(M1),SAVE3(M2),TSAVE(M2)
  3)FORMAT(12(9X,'OBJECT DISTANCE-',F6.0,'FT. (',F7.2,6M),1X),
  A 9X,'OBJECT DISTANCE-',F6.0,'FT. (',F7.2,6M),')
  IF (MAG.NE. 0) GO TO 270
  PRINT 1700
  1700)FORMAT(1M, '/')
  PRINT 4,SAVE(M),SAVE(M1),SAVE(M2)
  4)FORMAT(12(9X,'MAGNIFICATION -',F10.6,10X),
  (9X,'MAGNIFICATION -',F10.6),)
  PRINT 5,SAVE4(M),QSAVE(M),SAVE4(M1),QSAVE(M1),SAVE4(M2),QSAVE(M2)
  5)FORMAT(12(9X,'-G GROUP LENGTH:M-',F6.3,5M,10X),1X),

```



```

SUBROUTINE GENER      FORTRAN EXTENDED VERSION 2.0      03/01/72      10.55.56.
SUBROUTINE GENER
  DIMENSION GUESS1(450),GUESS2(450)
  COMMON RESULT,LENGTH,OBJECTD(12),A(12,36),SAVE (900),SAVE1(900)
  1)SAVE2(900),SAVE3(900),K,XMAX,XMIN,ROOT2,NUMBER,N,II,NF
  COMMON SAVE(900)
  COMMON MAG
  COMMON IN
  COMMON NM
  INTEGER OBJECTD
  C STARTING POINT FOR THE GENERATION TAKEN TO BE .01
  GUESS1(1)=.01
  DO 20 LX1=2,300
  C GOING UP TO THE MAXIMUM
  GUESS1(LX1)=GUESS1(LX1-1)*2.00(1./ROOT2)
  IF (GUESS1(LX1) .GE. XMAX) GO TO 25
  20 CONTINUE
  25 GUESS2(1)= .01
  DO 30 LX2= 2,300
  C GOING DOWN TO THE MINIMUM VALUE
  GUESS2(LX2)=GUESS2(LX2-1) /2.00(1./ROOT2)
  IF (GUESS2(LX2) .LE. XMIN) GO TO 35
  30 CONTINUE
  C TOTAL NUMBER OF MAGNIFICATIONS GENERATED = NUMBER
  35 NUMBER = LX1+LX2-1
  DO 40 LX=1,LX2
  LX=LX2+1-LX
  SAVE(LX) = GUESS2(LX)
  LX=LX2+1
  DO 50 LX=LX+NUMBER
  LX=LX-LX2+1
  SAVE(LX)=GUESS1(LX)
  LIM1=1
  LIM2=NUMBER
  IF (MAG.NE.-1) GO TO 55
  LIM=NMF+1
  LIM2=NMF+NUMBER
  DO 60 KK=LIM1,LIM2
  SAVE4(KK) = SAVE(KK) *766.
  SAVE2(KK) = 9999.
  SAVE3(KK) = 9999.
  60 CONTINUE
  LENGTH= 99999
  RETURN
  END

```

GEN01110
GEN01120

GEN01150
GEN01180
GEN01190

GEN01220
GEN01240
GEN01250
GEN01260
GEN01270
GEN01280
GEN01290
GEN01310

GEN01340
GEN01350

GEN01360
GEN01370

```
05      SUBROUTINE MAGNIFY
COMMON RESULT,LENGTH,OBJECTD(12),A(12,36),SAVE (900),SAVE1(900)
1) *SAVE2(900),*SAVE3(900),*K,XMAX,XMIN,ROOT2,NUMBER,N,II,NF
COMMON SAVE4(900)
COMMON MAG
COMMON IN
COMMON NNH
COMMON OBJECTD
NNH (K-1) * II
RESULT = 1./164.*SAVE(MN)
RETURN
END
```

MAG01420
MAG01430
MAG01440

APPENDIX C (DATA REDUCTION TABLES)

SECTION (A)

NOMINAL DIMENSIONS OF RESOLVING
POWER TEST TARGETS

NOMINAL DIMENSIONS OF RESOLVING POWER TEST TARGET

GROUP -6			GROUP -5			GROUP -4		
INTERVAL	WIDTH	UNIT	INTERVAL	WIDTH	UNIT	INTERVAL	WIDTH	UNIT
MM	INCH	MM	MM	INCH	MM	MM	INCH	MM
E 1	32.000	1.260	E 1	16.000	32.000	E 1	8.000	16.000
L 1	28.508	1.122	L 1	14.254	28.508	L 1	7.127	14.254
E 2	25.399	1.000	E 2	12.699	25.399	E 2	6.350	12.699
M 3	22.628	.891	M 3	11.314	22.628	M 3	5.657	11.314
E 4	20.159	.794	E 4	10.079	20.159	E 4	5.040	10.079
M 5	17.959	.707	M 5	8.980	17.959	M 5	4.490	8.980
T 6			T 6			T 6		

GROUP -3			GROUP -2			GROUP -1		
INTERVAL	WIDTH	UNIT	INTERVAL	WIDTH	UNIT	INTERVAL	WIDTH	UNIT
MM	INCH	MM	MM	INCH	MM	MM	INCH	MM
E 1	4.000	.157	E 1	2.000	4.000	E 1	1.000	2.000
L 1	3.563	.140	L 1	1.782	3.563	L 1	.891	1.782
E 2	3.175	.125	E 2	1.587	3.175	E 2	.794	1.587
M 3	2.828	.111	M 3	1.414	2.828	M 3	.707	1.414
E 4	2.520	.099	E 4	1.260	2.520	E 4	.630	1.260
M 5	2.245	.088	M 5	1.122	2.245	M 5	.561	1.122
T 6			T 6			T 6		

NOTES - (1) LENGTH OF -6 GROUP (TOP OF 2ND ELEMENT TO BOTTOM OF 6TH ELEMENT) 176MM, 30.02 INCHES
 (2) INTERVAL LENGTH EQUALS FIVE TIMES INTERVAL WIDTH

NOMENCLATURE

- INTERVAL - A LINE (BAR) OR A SPACE
- UNIT - A LINE AND ADJACENT SPACE
- PATTERN - THREE LINES AND TWO INCLUDED SPACES
- ELEMENT - AN ARRANGEMENT OF TWO PATTERNS SET AT RIGHT ANGLES TO EACH OTHER AND SEPARATED BY ONE UNIT SPACE
- GROUP - AN ARRAY OF SIX ELEMENTS

NOLTR 72-18

SECTION (B)

RESOLVING POWER DATA TABLES FOR SPECIFIC
LENS FOCAL LENGTH/OBJECT DISTANCE COMBINATIONS

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER) FOR 10MM FOCAL LENGTH LENSES

10MM				10MM				10MM			
FOCAL LENGTH -				FOCAL LENGTH -				FOCAL LENGTH -			
OBJECT DISTANCE -				OBJECT DISTANCE -				OBJECT DISTANCE -			
MAGNIFICATION -				MAGNIFICATION -				MAGNIFICATION -			
-6 GROUP LENGTH -				-6 GROUP LENGTH -				-6 GROUP LENGTH -			
GROUP				GROUP				GROUP			
E	-6	-5	-4	E	-6	-5	-4	E	-6	-5	-4
L 1	2.4	4.7	9.5	L 1	3.3	6.6	13.2	L 1	4.7	9.5	19.0
E 2	2.7	5.3	10.6	E 2	3.7	7.4	14.9	E 2	5.3	10.7	21.3
M 3	3.0	6.0	11.9	M 3	4.2	8.4	16.8	M 3	6.0	12.0	23.9
E 4	3.3	6.7	13.4	E 4	4.7	9.4	18.8	E 4	6.7	13.4	26.9
M 5	3.6	7.5	15.0	M 5	5.3	10.5	21.1	M 5	7.5	15.1	30.1
T 6	4.2	8.4	16.9	T 6	5.9	11.8	23.8	T 6	8.5	16.9	33.8

10MM				10MM				10MM			
FOCAL LENGTH -				FOCAL LENGTH -				FOCAL LENGTH -			
OBJECT DISTANCE -				OBJECT DISTANCE -				OBJECT DISTANCE -			
MAGNIFICATION -				MAGNIFICATION -				MAGNIFICATION -			
-6 GROUP LENGTH -				-6 GROUP LENGTH -				-6 GROUP LENGTH -			
GROUP				GROUP				GROUP			
E	-6	-5	-4	E	-6	-5	-4	E	-6	-5	-4
L 1	7.1	14.3	28.5	L 1	11.9	23.8	47.6	L 1	16.7	33.3	66.6
E 2	8.0	16.0	32.0	E 2	13.3	26.7	53.4	E 2	18.7	37.4	74.8
M 3	9.0	18.0	36.0	M 3	15.0	30.0	60.0	M 3	21.0	42.0	83.9
E 4	10.1	20.2	40.3	E 4	16.8	33.6	67.3	E 4	23.6	47.1	94.2
M 5	11.3	22.6	45.3	M 5	18.9	37.8	75.5	M 5	26.4	52.8	105.7
T 6	12.7	25.4	50.8	T 6	21.2	42.4	84.7	T 6	29.7	59.3	118.7

10MM				10MM				10MM			
FOCAL LENGTH -				FOCAL LENGTH -				FOCAL LENGTH -			
OBJECT DISTANCE -				OBJECT DISTANCE -				OBJECT DISTANCE -			
MAGNIFICATION -				MAGNIFICATION -				MAGNIFICATION -			
-6 GROUP LENGTH -				-6 GROUP LENGTH -				-6 GROUP LENGTH -			
GROUP				GROUP				GROUP			
E	-6	-5	-4	E	-6	-5	-4	E	-6	-5	-4
L 1	23.8	47.6	95.2	L 1	35.7	71.4	142.8	L 1	47.6	95.2	190.4
E 2	26.7	53.4	106.8	E 2	40.1	80.2	160.3	E 2	53.4	106.8	213.8
M 3	30.0	60.0	120.0	M 3	45.0	90.0	180.0	M 3	60.0	120.0	239.9
E 4	33.7	67.3	134.6	E 4	50.5	101.0	202.0	E 4	67.3	134.7	269.3
M 5	37.8	75.6	151.1	M 5	56.7	113.4	226.7	M 5	75.6	151.2	302.3
T 6	42.4	84.8	169.6	T 6	63.6	127.2	254.5	T 6	84.8	169.7	339.3

10MM				10MM				10MM			
FOCAL LENGTH -				FOCAL LENGTH -				FOCAL LENGTH -			
OBJECT DISTANCE -				OBJECT DISTANCE -				OBJECT DISTANCE -			
MAGNIFICATION -				MAGNIFICATION -				MAGNIFICATION -			
-6 GROUP LENGTH -				-6 GROUP LENGTH -				-6 GROUP LENGTH -			
GROUP				GROUP				GROUP			
E	-6	-5	-4	E	-6	-5	-4	E	-6	-5	-4
L 1	71.4	142.8	285.6	L 1	95.2	190.4	380.8	L 1	119.0	238.1	476.2
E 2	80.2	160.3	320.6	E 2	106.8	213.8	427.6	E 2	133.6	267.3	534.5
M 3	90.0	180.0	360.0	M 3	120.0	240.0	480.0	M 3	150.0	300.0	600.0
E 4	101.0	202.0	403.9	E 4	134.7	269.3	538.6	E 4	168.4	336.7	673.4
M 5	113.4	226.7	453.4	M 5	151.2	302.3	604.6	M 5	189.0	378.0	755.9
T 6	127.2	254.5	508.9	T 6	169.7	339.3	678.6	T 6	212.1	424.2	848.5

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER) FOR 10MM FOCAL LENGTH LENSES

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER) FOR 13MM FOCAL LENGTH LENSES

	13MM				13MM				13MM			
	FOCAL LENGTH	OBJECT DISTANCE	MAGNIFICATION	-6 GROUP LENGTH	FOCAL LENGTH	OBJECT DISTANCE	MAGNIFICATION	-6 GROUP LENGTH	FOCAL LENGTH	OBJECT DISTANCE	MAGNIFICATION	-6 GROUP LENGTH
E	-4	-5	-3	-4	-6	-5	-3	-4	-6	-5	-3	-4
L 1	1.8	3.6	14.5	7.3	2.5	5.1	20.4	10.2	3.6	7.3	29.2	58.4
L 2	2.0	4.1	16.3	8.2	2.9	5.7	22.9	11.4	4.1	8.2	32.8	65.5
M 3	2.3	4.6	18.3	9.2	3.2	6.4	25.7	12.8	4.6	9.2	36.8	73.5
E 4	2.6	5.1	20.5	10.3	3.6	7.2	28.8	14.4	5.2	10.3	41.3	82.5
M 5	2.9	5.8	23.1	11.5	4.0	8.1	32.4	16.2	5.8	11.5	46.3	92.6
T 6	3.2	6.5	25.9	12.9	4.5	9.1	36.4	18.2	6.5	13.0	52.0	104.0

	13MM				13MM				13MM			
	FOCAL LENGTH	OBJECT DISTANCE	MAGNIFICATION	-6 GROUP LENGTH	FOCAL LENGTH	OBJECT DISTANCE	MAGNIFICATION	-6 GROUP LENGTH	FOCAL LENGTH	OBJECT DISTANCE	MAGNIFICATION	-6 GROUP LENGTH
E	-4	-5	-3	-4	-6	-5	-3	-4	-6	-5	-3	-4
L 1	5.5	11.0	43.8	21.9	9.1	18.3	73.1	36.6	12.8	25.6	102.5	204.9
L 2	6.2	12.3	49.2	24.6	10.3	20.5	82.1	41.1	14.4	28.8	115.0	230.0
M 3	6.9	13.8	55.2	27.6	11.5	23.0	92.2	46.1	16.1	32.3	129.1	258.2
E 4	7.7	15.5	62.0	31.0	12.9	25.9	103.4	51.7	18.1	36.2	144.9	289.8
M 5	8.7	17.4	69.6	34.6	14.5	29.0	116.1	58.1	20.3	40.7	162.6	325.3
T 6	9.8	19.5	78.1	39.1	16.3	32.6	130.3	65.2	22.8	45.6	182.5	365.1

	13MM				13MM				13MM			
	FOCAL LENGTH	OBJECT DISTANCE	MAGNIFICATION	-6 GROUP LENGTH	FOCAL LENGTH	OBJECT DISTANCE	MAGNIFICATION	-6 GROUP LENGTH	FOCAL LENGTH	OBJECT DISTANCE	MAGNIFICATION	-6 GROUP LENGTH
E	-4	-5	-3	-4	-6	-5	-3	-4	-6	-5	-3	-4
L 1	18.3	36.6	146.4	73.2	27.5	54.9	219.7	109.8	36.6	73.2	293.0	585.9
L 2	20.5	41.1	164.3	82.2	30.8	61.6	246.6	123.3	41.1	82.2	328.8	657.7
M 3	23.1	46.1	184.5	92.2	34.6	69.2	276.8	138.4	46.1	92.2	369.1	738.2
E 4	25.9	51.8	207.1	103.5	38.8	77.7	310.7	157.3	51.8	103.5	414.3	828.6
M 5	29.1	58.1	232.4	116.2	43.6	87.2	348.7	174.7	58.1	116.2	465.0	930.1
T 6	32.6	65.2	260.9	130.4	48.9	97.9	391.4	195.7	65.2	130.4	522.0	1044.0

	13MM				13MM				13MM			
	FOCAL LENGTH	OBJECT DISTANCE	MAGNIFICATION	-6 GROUP LENGTH	FOCAL LENGTH	OBJECT DISTANCE	MAGNIFICATION	-6 GROUP LENGTH	FOCAL LENGTH	OBJECT DISTANCE	MAGNIFICATION	-6 GROUP LENGTH
E	-4	-5	-3	-4	-6	-5	-3	-4	-6	-5	-3	-4
L 1	54.9	109.7	439.3	219.7	73.2	146.5	586.0	293.0	91.6	183.1	732.6	1465.2
L 2	61.7	123.3	493.3	246.6	82.2	164.5	657.8	328.9	102.8	205.6	822.3	1645.2
M 3	69.2	138.4	551.7	276.8	92.3	184.6	738.4	369.2	115.4	230.7	923.0	1845.9
E 4	77.7	155.4	621.5	310.7	103.6	207.2	828.6	414.4	129.5	259.0	1044.3	2088.6
M 5	87.2	174.4	697.6	348.7	116.3	232.6	930.3	465.1	145.4	290.7	1154.4	2308.8
T 6	97.9	195.6	783.1	391.4	130.5	261.0	1044.0	522.1	163.2	326.3	1308.6	2617.2

C-B-2

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER) FOR 13MM FOCAL LENGTH LENSES

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER) FOR 15MM FOCAL LENGTH LENSES

	15MM				15MM			
	FOCAL LENGTH	OBJECT DISTANCE	MAGNIFICATION	-6 GROUP LENGTH	FOCAL LENGTH	OBJECT DISTANCE	MAGNIFICATION	-6 GROUP LENGTH
1	1.6	5.471	1.52M	7.584	3.2	7.271	2.13M	16.971
2	1.6	5.471	1.52M	7.584	3.5	7.271	2.13M	16.971
3	1.6	5.471	1.52M	7.584	3.8	7.271	2.13M	16.971
4	1.6	5.471	1.52M	7.584	4.1	7.271	2.13M	16.971
5	1.6	5.471	1.52M	7.584	4.4	7.271	2.13M	16.971
6	1.6	5.471	1.52M	7.584	4.7	7.271	2.13M	16.971
7	1.6	5.471	1.52M	7.584	5.0	7.271	2.13M	16.971
8	1.6	5.471	1.52M	7.584	5.3	7.271	2.13M	16.971
9	1.6	5.471	1.52M	7.584	5.6	7.271	2.13M	16.971
10	1.6	5.471	1.52M	7.584	5.9	7.271	2.13M	16.971
11	1.6	5.471	1.52M	7.584	6.2	7.271	2.13M	16.971
12	1.6	5.471	1.52M	7.584	6.5	7.271	2.13M	16.971
13	1.6	5.471	1.52M	7.584	6.8	7.271	2.13M	16.971
14	1.6	5.471	1.52M	7.584	7.1	7.271	2.13M	16.971
15	1.6	5.471	1.52M	7.584	7.4	7.271	2.13M	16.971
16	1.6	5.471	1.52M	7.584	7.7	7.271	2.13M	16.971
17	1.6	5.471	1.52M	7.584	8.0	7.271	2.13M	16.971
18	1.6	5.471	1.52M	7.584	8.3	7.271	2.13M	16.971
19	1.6	5.471	1.52M	7.584	8.6	7.271	2.13M	16.971
20	1.6	5.471	1.52M	7.584	8.9	7.271	2.13M	16.971
21	1.6	5.471	1.52M	7.584	9.2	7.271	2.13M	16.971
22	1.6	5.471	1.52M	7.584	9.5	7.271	2.13M	16.971
23	1.6	5.471	1.52M	7.584	9.8	7.271	2.13M	16.971
24	1.6	5.471	1.52M	7.584	10.1	7.271	2.13M	16.971
25	1.6	5.471	1.52M	7.584	10.4	7.271	2.13M	16.971
26	1.6	5.471	1.52M	7.584	10.7	7.271	2.13M	16.971
27	1.6	5.471	1.52M	7.584	11.0	7.271	2.13M	16.971
28	1.6	5.471	1.52M	7.584	11.3	7.271	2.13M	16.971
29	1.6	5.471	1.52M	7.584	11.6	7.271	2.13M	16.971
30	1.6	5.471	1.52M	7.584	11.9	7.271	2.13M	16.971
31	1.6	5.471	1.52M	7.584	12.2	7.271	2.13M	16.971
32	1.6	5.471	1.52M	7.584	12.5	7.271	2.13M	16.971
33	1.6	5.471	1.52M	7.584	12.8	7.271	2.13M	16.971
34	1.6	5.471	1.52M	7.584	13.1	7.271	2.13M	16.971
35	1.6	5.471	1.52M	7.584	13.4	7.271	2.13M	16.971
36	1.6	5.471	1.52M	7.584	13.7	7.271	2.13M	16.971
37	1.6	5.471	1.52M	7.584	14.0	7.271	2.13M	16.971
38	1.6	5.471	1.52M	7.584	14.3	7.271	2.13M	16.971
39	1.6	5.471	1.52M	7.584	14.6	7.271	2.13M	16.971
40	1.6	5.471	1.52M	7.584				

[illegible][illegible]

	15MM				15MM			
	150.FT.1 45.72M				200.FT.1 60.96M			
	-0.00325				-0.00246			
	-0.259MM(.0009IN.)				-0.188MM(.0074IN.)			
	-4 GROUP LENGTH-				-6 GROUP LENGTH-			
	-5				-5			
	-3				-3			
	-2				-2			
	-1				-1			
	0				0			
	1				1			
	2				2			
	3				3			
	4				4			
	5				5			
	6				6			
	7				7			
	8				8			
	9				9			
	10				10			
	11				11			
	12				12			
	13				13			
	14				14			
	15				15			
	16				16			
	17				17			
	18				18			
	19				19			
	20				20			
	21				21			
	22				22			
	23				23			
	24				24			
	25				25			
	26				26			
	27				27			
	28				28			
	29				29			
	30				30			
	31				31			
	32				32			
	33				33			
	34				34			
	35				35			
	36				36			
	37				37			
	38				38			
	39				39			
	40				40			
	41				41			
	42				42			
	43				43			
	44				44			
	45				45			
	46				46			
	47				47			
	48				48			
	49				49			
	50				50			
	51				51			
	52				52			
	53				53			
	54				54			
	55				55			
	56				56			
	57				57			
	58				58			
	59				59			
	60				60			
	61				61			
	62				62			
	63				63			
	64				64			
	65				65			
	66				66			
	67				67			
	68				68			
	69				69			
	70				70			
	71				71			
	72				72			
	73				73			
	74				74			
	75				75			
	76				76			
	77				77			
	78				78			
	79				79			
	80				80			
	81				81			
	82				82			
	83				83			
	84				84			
	85				85			
	86				86			
	87				87			
	88				88			
	89				89			
	90				90			
	91				91			
	92				92			
	93				93			
	94				94			
	95				95			
	96				96			
	97				97			
	98				98			
	99				99			
	100				100			

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER) FOR 18MM FOCAL LENGTH LENSES

18MM		18MM		18MM		18MM	
FOCAL LENGTH	-	FOCAL LENGTH	-	FOCAL LENGTH	-	FOCAL LENGTH	-
OBJECT DISTANCE	5.0 FT. (1.52M)	OBJECT DISTANCE	7.0 FT. (2.13M)	OBJECT DISTANCE	10.0 FT. (3.05M)	OBJECT DISTANCE	16.0 FT. (4.88M)
MAGNIFICATION	.011952	MAGNIFICATION	.008508	MAGNIFICATION	.006250	MAGNIFICATION	.004591
-6 GROUP LENGTH	4.120MM (.1350IN.)	-6 GROUP LENGTH	6.492MM (.2556IN.)	-6 GROUP LENGTH	8.864MM (.3490IN.)	-6 GROUP LENGTH	11.236MM (.4423IN.)
GROUP		GROUP		GROUP		GROUP	
-6	-5	-6	-5	-6	-5	-6	-5
L 1	1.3	L 1	1.8	L 1	2.6	L 1	4.2
L 2	2.6	L 2	3.7	L 2	5.3	L 2	8.4
M 3	5.9	M 3	8.2	M 3	12.7	M 3	20.5
M 4	11.7	M 4	16.5	M 4	26.2	M 4	44.2
M 5	23.5	M 5	33.0	M 5	52.4	M 5	94.5
T 6	47.0	T 6	66.0	T 6	104.7	T 6	190.0

18MM		18MM		18MM		18MM	
FOCAL LENGTH	-	FOCAL LENGTH	-	FOCAL LENGTH	-	FOCAL LENGTH	-
OBJECT DISTANCE	15.0 FT. (4.57M)	OBJECT DISTANCE	25.0 FT. (7.62M)	OBJECT DISTANCE	35.0 FT. (10.67M)	OBJECT DISTANCE	45.0 FT. (13.72M)
MAGNIFICATION	.003953	MAGNIFICATION	.002368	MAGNIFICATION	.001690	MAGNIFICATION	.001268
-6 GROUP LENGTH	3.010MM (.1187IN.)	-6 GROUP LENGTH	1.807MM (.0711IN.)	-6 GROUP LENGTH	1.290MM (.0508IN.)	-6 GROUP LENGTH	0.967MM (.0381IN.)
GROUP		GROUP		GROUP		GROUP	
-6	-5	-6	-5	-6	-5	-6	-5
L 1	4.0	L 1	6.6	L 1	9.2	L 1	13.7
L 2	7.9	L 2	13.2	L 2	18.5	L 2	28.1
M 3	15.8	M 3	26.4	M 3	37.0	M 3	56.6
M 4	31.6	M 4	52.8	M 4	74.0	M 4	113.2
M 5	63.2	M 5	105.6	M 5	148.1	M 5	226.4
T 6	126.4	T 6	211.2	T 6	296.8	T 6	452.8

18MM		18MM		18MM		18MM	
FOCAL LENGTH	-	FOCAL LENGTH	-	FOCAL LENGTH	-	FOCAL LENGTH	-
OBJECT DISTANCE	50.0 FT. (15.24M)	OBJECT DISTANCE	75.0 FT. (22.86M)	OBJECT DISTANCE	100.0 FT. (30.48M)	OBJECT DISTANCE	150.0 FT. (45.72M)
MAGNIFICATION	.001182	MAGNIFICATION	.000788	MAGNIFICATION	.000591	MAGNIFICATION	.000436
-6 GROUP LENGTH	.902MM (.0355IN.)	-6 GROUP LENGTH	.601MM (.0237IN.)	-6 GROUP LENGTH	.451MM (.0178IN.)	-6 GROUP LENGTH	.338MM (.0133IN.)
GROUP		GROUP		GROUP		GROUP	
-6	-5	-6	-5	-6	-5	-6	-5
L 1	13.2	L 1	19.2	L 1	26.7	L 1	40.0
L 2	26.4	L 2	38.4	L 2	53.4	L 2	80.0
M 3	52.8	M 3	76.8	M 3	106.8	M 3	160.0
M 4	105.6	M 4	153.6	M 4	213.6	M 4	320.0
M 5	211.2	M 5	307.2	M 5	427.2	M 5	640.0
T 6	422.4	T 6	614.4	T 6	854.4	T 6	1280.0

18MM		18MM		18MM		18MM	
FOCAL LENGTH	-	FOCAL LENGTH	-	FOCAL LENGTH	-	FOCAL LENGTH	-
OBJECT DISTANCE	150.0 FT. (45.72M)	OBJECT DISTANCE	200.0 FT. (60.96M)	OBJECT DISTANCE	250.0 FT. (76.20M)	OBJECT DISTANCE	300.0 FT. (91.44M)
MAGNIFICATION	.000394	MAGNIFICATION	.000295	MAGNIFICATION	.000236	MAGNIFICATION	.000185
-6 GROUP LENGTH	.301MM (.0118IN.)	-6 GROUP LENGTH	.225MM (.0089IN.)	-6 GROUP LENGTH	.180MM (.0071IN.)	-6 GROUP LENGTH	.135MM (.0053IN.)
GROUP		GROUP		GROUP		GROUP	
-6	-5	-6	-5	-6	-5	-6	-5
L 1	39.7	L 1	52.9	L 1	66.1	L 1	80.1
L 2	79.4	L 2	105.8	L 2	132.2	L 2	160.2
M 3	158.8	M 3	211.6	M 3	264.4	M 3	320.4
M 4	317.6	M 4	423.2	M 4	528.8	M 4	640.8
M 5	635.2	M 5	846.4	M 5	1057.6	M 5	1281.6
T 6	1270.4	T 6	1692.8	T 6	2115.2	T 6	2563.2

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER) FOR 18MM FOCAL LENGTH LENSES

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER) FOR 21MM FOCAL LENGTH LENSES

21MM		21MM		21MM		21MM	
FOCAL LENGTH -	5.0 FT. (1.52M)	FOCAL LENGTH -	7.0 FT. (2.13M)	FOCAL LENGTH -	10.0 FT. (3.05M)	FOCAL LENGTH -	10.0 FT. (3.05M)
OBJECT DISTANCE -	0.0040	OBJECT DISTANCE -	0.0040	OBJECT DISTANCE -	0.0040	OBJECT DISTANCE -	0.0040
MAGNIFICATION -	0.0040	MAGNIFICATION -	0.0040	MAGNIFICATION -	0.0040	MAGNIFICATION -	0.0040
-6 GROUP LENGTH -	10.061MM (.4197IN.)	-6 GROUP LENGTH -	7.584MM (.2986IN.)	-6 GROUP LENGTH -	5.293MM (.2083IN.)	-6 GROUP LENGTH -	5.293MM (.2083IN.)
GROUP	GROUP	GROUP	GROUP	GROUP	GROUP	GROUP	GROUP
E 1	-6	-5	-4	-3	-2	-1	-1
L 1	1.1	2.2	3.3	4.4	5.5	6.6	7.7
E 2	1.3	2.5	3.7	4.9	6.1	7.3	8.5
M 3	1.4	2.8	4.0	5.2	6.4	7.6	8.8
E 4	1.6	3.2	4.4	5.6	6.8	8.0	9.2
M 5	1.8	3.6	5.0	6.4	7.8	9.2	10.6
T 6	2.0	4.0	5.6	7.2	8.8	10.4	12.0

21MM		21MM		21MM		21MM	
FOCAL LENGTH -	15.0 FT. (4.57M)	FOCAL LENGTH -	25.0 FT. (7.62M)	FOCAL LENGTH -	35.0 FT. (10.67M)	FOCAL LENGTH -	35.0 FT. (10.67M)
OBJECT DISTANCE -	0.0040	OBJECT DISTANCE -	0.0040	OBJECT DISTANCE -	0.0040	OBJECT DISTANCE -	0.0040
MAGNIFICATION -	0.0040	MAGNIFICATION -	0.0040	MAGNIFICATION -	0.0040	MAGNIFICATION -	0.0040
-6 GROUP LENGTH -	3.521MM (.1386IN.)	-6 GROUP LENGTH -	2.109MM (.0830IN.)	-6 GROUP LENGTH -	1.585MM (.0624IN.)	-6 GROUP LENGTH -	1.585MM (.0624IN.)
GROUP	GROUP	GROUP	GROUP	GROUP	GROUP	GROUP	GROUP
E 1	-6	-5	-4	-3	-2	-1	-1
L 1	3.4	6.8	10.2	13.6	17.0	20.4	23.8
E 2	3.8	7.6	11.4	14.8	18.2	21.6	25.0
M 3	4.2	8.4	12.6	16.0	19.4	22.8	26.2
E 4	4.6	9.2	13.4	17.0	20.4	23.8	27.2
M 5	5.4	10.8	15.0	19.4	23.8	28.2	32.6
T 6	6.0	12.0	16.0	20.4	25.0	30.0	34.0

21MM		21MM		21MM		21MM	
FOCAL LENGTH -	50.0 FT. (15.24M)	FOCAL LENGTH -	75.0 FT. (22.86M)	FOCAL LENGTH -	100.0 FT. (30.48M)	FOCAL LENGTH -	100.0 FT. (30.48M)
OBJECT DISTANCE -	0.01380	OBJECT DISTANCE -	0.00919	OBJECT DISTANCE -	0.00699	OBJECT DISTANCE -	0.00699
MAGNIFICATION -	0.01380	MAGNIFICATION -	0.00919	MAGNIFICATION -	0.00699	MAGNIFICATION -	0.00699
-6 GROUP LENGTH -	1.053MM (.0414IN.)	-6 GROUP LENGTH -	0.702MM (.0276IN.)	-6 GROUP LENGTH -	0.526MM (.0207IN.)	-6 GROUP LENGTH -	0.526MM (.0207IN.)
GROUP	GROUP	GROUP	GROUP	GROUP	GROUP	GROUP	GROUP
E 1	-6	-5	-4	-3	-2	-1	-1
L 1	11.3	22.6	33.9	45.2	56.5	67.8	79.1
E 2	12.7	25.4	38.1	50.8	62.1	73.4	84.7
M 3	14.0	28.0	41.6	55.5	66.8	78.1	89.4
E 4	16.0	32.0	48.0	64.0	76.8	89.6	102.4
M 5	18.0	36.0	54.0	72.0	86.4	100.8	114.0
T 6	20.2	40.4	60.6	80.6	96.6	112.6	128.6

21MM		21MM		21MM		21MM	
FOCAL LENGTH -	150.0 FT. (45.72M)	FOCAL LENGTH -	200.0 FT. (60.96M)	FOCAL LENGTH -	250.0 FT. (76.20M)	FOCAL LENGTH -	250.0 FT. (76.20M)
OBJECT DISTANCE -	0.0040	OBJECT DISTANCE -	0.00345	OBJECT DISTANCE -	0.00276	OBJECT DISTANCE -	0.00276
MAGNIFICATION -	0.0040	MAGNIFICATION -	0.00345	MAGNIFICATION -	0.00276	MAGNIFICATION -	0.00276
-6 GROUP LENGTH -	0.351MM (.0138IN.)	-6 GROUP LENGTH -	0.263MM (.0104IN.)	-6 GROUP LENGTH -	0.210MM (.0083IN.)	-6 GROUP LENGTH -	0.210MM (.0083IN.)
GROUP	GROUP	GROUP	GROUP	GROUP	GROUP	GROUP	GROUP
E 1	-6	-5	-4	-3	-2	-1	-1
L 1	34.0	68.0	102.0	136.0	170.0	204.0	238.0
E 2	38.2	76.4	114.6	152.8	191.0	229.2	267.4
M 3	42.8	85.6	128.4	171.2	212.8	251.6	290.4
E 4	48.1	96.2	144.2	192.4	238.6	286.2	331.8
M 5	54.0	108.0	162.0	216.0	268.0	322.0	368.0
T 6	60.6	121.2	181.6	242.2	295.6	352.6	400.6

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER) FOR 21MM FOCAL LENGTH LENSES

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER) FOR 25MM FOCAL LENGTH LENSES

25MM				25MM				25MM			
FOCAL LENGTH -				FOCAL LENGTH -				FOCAL LENGTH -			
OBJECT DISTANCE -				OBJECT DISTANCE -				OBJECT DISTANCE -			
MAGNIFICATION -				MAGNIFICATION -				MAGNIFICATION -			
-6 GROUP LENGTH -				-6 GROUP LENGTH -				-6 GROUP LENGTH -			
GROUP				GROUP				GROUP			
E	-6	-5	-4	E	-6	-5	-4	E	-6	-5	-4
L 1	1.9	3.8	7.6	L 1	2.8	5.7	11.4	L 1	4.7	9.5	19.0
E 2	2.1	4.2	8.5	E 2	3.2	6.4	12.8	E 2	5.3	10.7	21.3
M 3	2.4	4.8	9.6	M 3	3.6	7.2	14.3	M 3	6.0	12.0	23.9
E 4	2.7	5.3	10.7	E 4	4.0	8.0	16.0	E 4	6.7	13.4	26.9
M 5	3.0	6.0	12.0	M 5	4.5	9.0	18.0	M 5	7.5	15.1	30.1
T 6	3.4	6.7	13.5	T 6	5.1	10.1	20.3	T 6	8.5	16.9	33.6

25MM				25MM				25MM			
FOCAL LENGTH -				FOCAL LENGTH -				FOCAL LENGTH -			
OBJECT DISTANCE -				OBJECT DISTANCE -				OBJECT DISTANCE -			
MAGNIFICATION -				MAGNIFICATION -				MAGNIFICATION -			
-6 GROUP LENGTH -				-6 GROUP LENGTH -				-6 GROUP LENGTH -			
GROUP				GROUP				GROUP			
E	-6	-5	-4	E	-6	-5	-4	E	-6	-5	-4
L 1	6.7	13.3	26.5	L 1	9.5	19.0	38.0	L 1	14.3	28.5	57.1
E 2	7.5	14.9	29.9	E 2	10.7	21.3	42.7	E 2	16.0	32.0	64.1
M 3	8.6	16.8	33.5	M 3	12.0	24.0	47.9	M 3	18.0	36.0	71.9
E 4	9.4	18.8	37.4	E 4	13.4	26.9	53.8	E 4	20.2	40.4	80.7
M 5	10.4	21.1	42.2	M 5	15.1	30.2	60.4	M 5	22.7	45.3	90.6
T 6	11.9	23.7	47.6	T 6	16.9	33.9	67.8	T 6	25.4	50.9	101.7

25MM				25MM				25MM			
FOCAL LENGTH -				FOCAL LENGTH -				FOCAL LENGTH -			
OBJECT DISTANCE -				OBJECT DISTANCE -				OBJECT DISTANCE -			
MAGNIFICATION -				MAGNIFICATION -				MAGNIFICATION -			
-6 GROUP LENGTH -				-6 GROUP LENGTH -				-6 GROUP LENGTH -			
GROUP				GROUP				GROUP			
E	-6	-5	-4	E	-6	-5	-4	E	-6	-5	-4
L 1	19.0	38.1	76.1	L 1	29.6	59.1	118.2	L 1	38.1	76.2	152.3
E 2	21.4	42.7	85.3	E 2	32.1	64.1	128.2	E 2	42.7	85.3	171.0
M 3	24.0	48.0	96.0	M 3	35.0	70.0	140.0	M 3	48.0	96.0	192.0
E 4	26.9	53.8	107.7	E 4	38.0	76.0	152.0	E 4	53.8	107.7	215.4
M 5	30.2	60.4	120.9	M 5	43.2	86.4	172.8	M 5	60.4	120.9	241.8
T 6	33.9	67.8	135.7	T 6	47.9	95.8	191.6	T 6	67.9	135.7	271.4

25MM				25MM				25MM			
FOCAL LENGTH -				FOCAL LENGTH -				FOCAL LENGTH -			
OBJECT DISTANCE -				OBJECT DISTANCE -				OBJECT DISTANCE -			
MAGNIFICATION -				MAGNIFICATION -				MAGNIFICATION -			
-6 GROUP LENGTH -				-6 GROUP LENGTH -				-6 GROUP LENGTH -			
GROUP				GROUP				GROUP			
E	-6	-5	-4	E	-6	-5	-4	E	-6	-5	-4
L 1	47.0	94.0	188.0	L 1	57.1	114.2	228.5	L 1	76.2	152.3	304.7
E 2	53.4	106.8	213.6	E 2	64.1	128.2	256.5	E 2	85.3	171.0	342.1
M 3	60.0	120.0	240.0	M 3	72.0	144.0	288.0	M 3	96.0	192.0	384.0
E 4	67.3	134.7	269.4	E 4	80.8	161.6	323.2	E 4	107.7	215.4	430.8
M 5	75.0	150.0	300.0	M 5	90.7	181.3	362.7	M 5	120.9	241.8	483.6
T 6	84.6	169.2	338.4	T 6	101.8	203.5	407.1	T 6	135.7	271.4	542.9

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER) FOR 25MM FOCAL LENGTH LENSES

28MM FOCAL LENGTH LENSES

[illegible]

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER) FOR 35MM FOCAL LENGTH LENSES

35MM		35MM		35MM		35MM	
FOCAL LENGTH	OBJECT DISTANCE	FOCAL LENGTH	OBJECT DISTANCE	FOCAL LENGTH	OBJECT DISTANCE	FOCAL LENGTH	OBJECT DISTANCE
10.5 FT. (3.05M)	0.011516	15.5 FT. (4.57M)	0.07714	20.5 FT. (6.06M)	0.11516	25.5 FT. (7.62M)	0.14614
MAGNIFICATION	MAGNIFICATION	MAGNIFICATION	MAGNIFICATION	MAGNIFICATION	MAGNIFICATION	MAGNIFICATION	MAGNIFICATION
-6 GROUP LENGTH	-6 GROUP LENGTH	-6 GROUP LENGTH	-6 GROUP LENGTH	-6 GROUP LENGTH	-6 GROUP LENGTH	-6 GROUP LENGTH	-6 GROUP LENGTH
GROUP	GROUP	GROUP	GROUP	GROUP	GROUP	GROUP	GROUP
-6	-5	-6	-5	-6	-5	-6	-5
1.3	2.7	2.0	4.1	2.0	4.1	3.4	6.8
1.5	3.0	2.2	4.5	2.2	4.5	3.8	7.6
1.7	3.4	2.6	5.1	2.6	5.1	4.3	8.5
1.9	3.8	2.9	5.7	2.9	5.7	4.8	9.6
2.1	4.3	3.2	6.4	3.2	6.4	5.4	10.8
2.4	4.8	3.6	7.2	3.6	7.2	6.0	12.1
E	L	E	L	E	L	E	L
1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6
T	T	T	T	T	T	T	T

35MM		35MM		35MM		35MM	
FOCAL LENGTH	OBJECT DISTANCE	FOCAL LENGTH	OBJECT DISTANCE	FOCAL LENGTH	OBJECT DISTANCE	FOCAL LENGTH	OBJECT DISTANCE
35.5 FT. (10.67M)	0.03292	50.5 FT. (15.24M)	0.02302	65.5 FT. (19.65M)	0.01516	80.5 FT. (24.06M)	0.00874
MAGNIFICATION	MAGNIFICATION	MAGNIFICATION	MAGNIFICATION	MAGNIFICATION	MAGNIFICATION	MAGNIFICATION	MAGNIFICATION
-6 GROUP LENGTH	-6 GROUP LENGTH	-6 GROUP LENGTH	-6 GROUP LENGTH	-6 GROUP LENGTH	-6 GROUP LENGTH	-6 GROUP LENGTH	-6 GROUP LENGTH
GROUP	GROUP	GROUP	GROUP	GROUP	GROUP	GROUP	GROUP
-6	-5	-6	-5	-6	-5	-6	-5
4.7	9.5	6.8	13.6	6.8	13.6	10.2	20.4
5.3	10.7	7.6	15.2	7.6	15.2	11.2	22.9
6.0	12.0	8.6	17.1	8.6	17.1	12.6	25.7
6.7	13.4	9.6	19.2	9.6	19.2	14.4	28.8
7.5	15.1	10.8	21.6	10.8	21.6	16.2	32.4
8.5	16.9	12.1	24.2	12.1	24.2	18.2	36.3
E	L	E	L	E	L	E	L
1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6
T	T	T	T	T	T	T	T

35MM		35MM		35MM		35MM	
FOCAL LENGTH	OBJECT DISTANCE	FOCAL LENGTH	OBJECT DISTANCE	FOCAL LENGTH	OBJECT DISTANCE	FOCAL LENGTH	OBJECT DISTANCE
100.5 FT. (30.48M)	0.01150	150.5 FT. (45.72M)	0.00766	200.5 FT. (60.96M)	0.00574	250.5 FT. (76.20M)	0.00428
MAGNIFICATION	MAGNIFICATION	MAGNIFICATION	MAGNIFICATION	MAGNIFICATION	MAGNIFICATION	MAGNIFICATION	MAGNIFICATION
-6 GROUP LENGTH	-6 GROUP LENGTH	-6 GROUP LENGTH	-6 GROUP LENGTH	-6 GROUP LENGTH	-6 GROUP LENGTH	-6 GROUP LENGTH	-6 GROUP LENGTH
GROUP	GROUP	GROUP	GROUP	GROUP	GROUP	GROUP	GROUP
-6	-5	-6	-5	-6	-5	-6	-5
13.6	27.2	20.4	40.8	20.4	40.8	27.2	54.4
15.3	30.5	22.9	45.8	22.9	45.8	30.5	61.1
17.1	34.2	25.7	51.4	25.7	51.4	34.2	68.6
19.2	38.4	28.8	57.7	28.8	57.7	38.4	77.0
21.6	43.2	32.4	64.8	32.4	64.8	43.2	86.4
24.2	48.4	36.3	72.7	36.3	72.7	48.4	97.0
E	L	E	L	E	L	E	L
1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6
T	T	T	T	T	T	T	T

35MM		35MM		35MM		35MM	
FOCAL LENGTH	OBJECT DISTANCE	FOCAL LENGTH	OBJECT DISTANCE	FOCAL LENGTH	OBJECT DISTANCE	FOCAL LENGTH	OBJECT DISTANCE
250.5 FT. (76.20M)	0.00428	300.5 FT. (91.44M)	0.00383	400.5 FT. (121.92M)	0.00287	500.5 FT. (152.40M)	0.00214
MAGNIFICATION	MAGNIFICATION	MAGNIFICATION	MAGNIFICATION	MAGNIFICATION	MAGNIFICATION	MAGNIFICATION	MAGNIFICATION
-6 GROUP LENGTH	-6 GROUP LENGTH	-6 GROUP LENGTH	-6 GROUP LENGTH	-6 GROUP LENGTH	-6 GROUP LENGTH	-6 GROUP LENGTH	-6 GROUP LENGTH
GROUP	GROUP	GROUP	GROUP	GROUP	GROUP	GROUP	GROUP
-6	-5	-6	-5	-6	-5	-6	-5
24.0	48.0	40.8	81.6	40.8	81.6	54.4	108.8
28.8	57.6	48.4	96.8	48.4	96.8	64.8	129.6
34.2	68.4	57.7	115.4	57.7	115.4	77.0	154.0
40.8	81.6	68.6	137.2	68.6	137.2	91.4	182.8
48.4	96.8	81.6	163.2	81.6	163.2	108.8	217.6
54.4	108.8	91.4	182.8	91.4	182.8	121.9	243.8
E	L	E	L	E	L	E	L
1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6
T	T	T	T	T	T	T	T

COMMON FOCAL LENGTH LENSES

FOCAL LENGTH -	40MM	3.05M
OBJECT DISTANCE -	10.75M	

	GROUP					
	-6	-5	-4	-3	-2	-1
GROUP LENGTH=10.122mm	1.2	2.3	4.7	9.4	18.8	37.6
GROUP LENGTH=10.122mm	1.2	2.3	4.7	9.4	18.8	37.6

FOCAL LENGTH - 40MM
OBJECT DISTANCE - 35.FT. (10.67M)

	-6 GROUP	-5 GROUP	-4 GROUP	-3 GROUP	-2 GROUP	-1 GROUP
E	4.2	6.3	16.0	33.2	66.4	132.9
L	4.2	6.3	16.0	33.2	66.4	132.9

FOCAL LENGTH - 40MM
OBJECT DISTANCE- 100.FT. (30.48M

	-6	-5	-4	-3	-2	-1
E	11.9	23.8	47.6	95.1	190.2	380.5
L	11.9	23.7	47.4	94.8	189.6	379.1

FOCAL LENGTH - 40MM
OBJECT DISTANCE - 250.FT. (76.20M)

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER) FOR 45MM FOCAL LENGTH LENSES

FOCAL LENGTH - 45MM		FOCAL LENGTH - 45MM		FOCAL LENGTH - 45MM	
OBJECT DISTANCE -	10. FT. (3.05M)	OBJECT DISTANCE -	15. FT. (4.57M)	OBJECT DISTANCE -	25. FT. (7.62M)
MAGNIFICATION -	.014985	MAGNIFICATION -	.009940	MAGNIFICATION -	.005941
-6 GROUP LENGTH- GROUP	11.434MM (.4501IN.)	-6 GROUP LENGTH- GROUP	7.584MM (.2986IN.)	-6 GROUP LENGTH- GROUP	4.533MM (.1785IN.)
E	-6	-5	-6	-5	-6
L 1	1.0	2.1	1.6	3.1	2.6
L 2	1.2	2.3	1.8	3.3	2.8
M 3	1.3	2.6	2.0	4.0	3.0
E 4	1.5	2.9	2.2	4.4	3.3
M 5	1.7	3.3	2.5	5.0	3.7
T 6	1.9	3.7	2.8	5.6	4.2

FOCAL LENGTH - 45MM		FOCAL LENGTH - 45MM		FOCAL LENGTH - 45MM	
OBJECT DISTANCE -	35. FT. (10.67M)	OBJECT DISTANCE -	50. FT. (15.24M)	OBJECT DISTANCE -	75. FT. (22.86M)
MAGNIFICATION -	.004236	MAGNIFICATION -	.002962	MAGNIFICATION -	.001972
-6 GROUP LENGTH- GROUP	3.232MM (.1272IN.)	-6 GROUP LENGTH- GROUP	2.260MM (.0890IN.)	-6 GROUP LENGTH- GROUP	1.585MM (.0622IN.)
E	-6	-5	-6	-5	-6
L 1	3.7	7.4	5.3	10.6	7.9
L 2	4.1	8.3	5.9	11.8	8.9
M 3	4.6	9.3	6.6	13.3	10.0
E 4	5.2	10.4	7.5	14.9	11.2
M 5	5.9	11.7	8.4	16.8	12.6
T 6	6.6	13.1	9.4	18.8	14.1

FOCAL LENGTH - 45MM		FOCAL LENGTH - 45MM		FOCAL LENGTH - 45MM	
OBJECT DISTANCE -	100. FT. (30.48M)	OBJECT DISTANCE -	150. FT. (45.72M)	OBJECT DISTANCE -	200. FT. (60.96M)
MAGNIFICATION -	.001479	MAGNIFICATION -	.000985	MAGNIFICATION -	.000739
-6 GROUP LENGTH- GROUP	1.128MM (.0444IN.)	-6 GROUP LENGTH- GROUP	.752MM (.0296IN.)	-6 GROUP LENGTH- GROUP	.564MM (.0222IN.)
E	-6	-5	-6	-5	-6
L 1	10.6	21.1	15.9	31.7	21.2
L 2	11.9	23.7	17.8	35.6	23.7
M 3	13.3	26.6	20.0	40.0	26.6
E 4	14.9	29.9	22.4	44.9	29.9
M 5	16.6	33.6	25.2	50.4	33.6
T 6	18.8	37.7	28.3	56.5	37.7

FOCAL LENGTH - 45MM		FOCAL LENGTH - 45MM		FOCAL LENGTH - 45MM	
OBJECT DISTANCE -	250. FT. (76.20M)	OBJECT DISTANCE -	300. FT. (91.44M)	OBJECT DISTANCE -	400. FT. (121.92M)
MAGNIFICATION -	.000591	MAGNIFICATION -	.000492	MAGNIFICATION -	.000369
-6 GROUP LENGTH- GROUP	.451MM (.0178IN.)	-6 GROUP LENGTH- GROUP	.378MM (.0148IN.)	-6 GROUP LENGTH- GROUP	.282MM (.0111IN.)
E	-6	-5	-6	-5	-6
L 1	26.4	52.9	31.7	63.5	42.3
L 2	29.7	59.4	35.6	71.2	47.5
M 3	33.3	66.6	40.0	80.0	53.3
E 4	37.4	74.8	44.9	89.8	59.8
M 5	42.0	84.0	50.4	100.8	67.2
T 6	47.1	94.2	56.5	113.1	75.4

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER) FOR 45MM FOCAL LENGTH LENSES

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER) FOR 50MM FOCAL LENGTH LENSES

FOCAL LENGTH - 50MM												FOCAL LENGTH - 50MM												FOCAL LENGTH - 50MM															
OBJECT DISTANCE - 10.FT. (3.05M)				OBJECT DISTANCE - 15.FT. (4.57M)				OBJECT DISTANCE - 25.FT. (7.62M)				OBJECT DISTANCE - 10.FT. (3.05M)				OBJECT DISTANCE - 15.FT. (4.57M)				OBJECT DISTANCE - 25.FT. (7.62M)				OBJECT DISTANCE - 10.FT. (3.05M)				OBJECT DISTANCE - 15.FT. (4.57M)				OBJECT DISTANCE - 25.FT. (7.62M)							
MAGNIFICATION - .016578				MAGNIFICATION - .011057				MAGNIFICATION - .006605				MAGNIFICATION - .016578				MAGNIFICATION - .011057				MAGNIFICATION - .006605				MAGNIFICATION - .016578				MAGNIFICATION - .011057				MAGNIFICATION - .006605							
-6 GROUP LENGTH=12.725MM (.5010IN.)				-6 GROUP LENGTH= 8.437MM (.3321IN.)				-6 GROUP LENGTH= 5.040MM (.1984IN.)				-6 GROUP LENGTH=12.725MM (.5010IN.)				-6 GROUP LENGTH= 8.437MM (.3321IN.)				-6 GROUP LENGTH= 5.040MM (.1984IN.)				-6 GROUP LENGTH=12.725MM (.5010IN.)				-6 GROUP LENGTH= 8.437MM (.3321IN.)				-6 GROUP LENGTH= 5.040MM (.1984IN.)							
GROUP				GROUP				GROUP				GROUP				GROUP				GROUP				GROUP				GROUP				GROUP				GROUP			
E	-6	-5	-4	-3	-2	-1	E	-6	-5	-4	-3	-2	-1	E	-6	-5	-4	-3	-2	-1	E	-6	-5	-4	-3	-2	-1	E	-6	-5	-4	-3	-2	-1					
L	1	1	1	1	1	1	L	1	1	1	1	1	1	L	1	1	1	1	1	1	L	1	1	1	1	1	L	1	1	1	1	1	1						
E	2	1	1	1	1	1	E	2	1	1	1	1	1	E	2	1	1	1	1	1	E	2	1	1	1	1	E	2	1	1	1	1	1						
M	3	2	2	2	2	2	M	3	2	2	2	2	2	M	3	2	2	2	2	2	M	3	2	2	2	2	M	3	2	2	2	2	2						
E	4	3	3	3	3	3	E	4	3	3	3	3	3	E	4	3	3	3	3	3	E	4	3	3	3	3	E	4	3	3	3	3	3						
M	5	4	4	4	4	4	M	5	4	4	4	4	4	M	5	4	4	4	4	4	M	5	4	4	4	4	M	5	4	4	4	4	4						
T	6	5	5	5	5	5	T	6	5	5	5	5	5	T	6	5	5	5	5	5	T	6	5	5	5	5	T	6	5	5	5	5	5						

50MM											
FOCAL LENGTH - 50.FT. (15.24M)				FOCAL LENGTH - 75.FT. (22.86M)				FOCAL LENGTH - 100.FT. (30.48M)			
OBJECT DISTANCE - .003292				OBJECT DISTANCE - .002192				OBJECT DISTANCE - .001643			
MAGNIFICATION - 2.512MM (.0989IN.)				MAGNIFICATION - 1.673MM (.0658IN.)				MAGNIFICATION - 1.254MM (.0494IN.)			
-6 GROUP LENGTH- GROUP				-6 GROUP LENGTH- GROUP				-6 GROUP LENGTH- GROUP			
E	-6	-5	-4	E	-6	-5	-4	E	-6	-5	-4
L	1	1	1	L	1	1	1	L	1	1	1
E	2	1	1	E	2	1	1	E	2	1	1
M	3	1	1	M	3	1	1	M	3	1	1
E	4	1	1	E	4	1	1	E	4	1	1
M	5	1	1	M	5	1	1	M	5	1	1
T	6	1	1	T	6	1	1	T	6	1	1

FOCAL LENGTH - 50MM											
OBJECT DISTANCE- 200.FT.(60.96M)											
MAGNIFICATION - .000821											
-6 GROUP LENGTH- .626MM(.0247IN.)											
GROUP											
E	-6	-5	-4	-3	-2	-1	E	-6	-5	-4	-3
L	1	1	1	1	1	1	L	1	1	1	1
E	2	1	1	1	1	1	E	2	1	1	1
M	3	1	1	1	1	1	M	3	1	1	1
E	4	1	1	1	1	1	E	4	1	1	1
M	5	1	1	1	1	1	M	5	1	1	1
T	6	1	1	1	1	1	T	6	1	1	1

FOCAL LENGTH - 50MM											
OBJECT DISTANCE- 200.FT.(60.96M)											
MAGNIFICATION - .000821											
-6 GROUP LENGTH- .626MM(.0247IN.)											
GROUP											
E	-6	-5	-4	-3	-2	-1	E	-6	-5	-4	-3
L	1	1	1	1	1	1	L	1	1	1	1
E	2	1	1	1	1	1	E	2	1	1	1
M	3	1	1	1	1	1	M	3	1	1	1
E	4	1	1	1	1	1	E	4	1	1	1
M	5	1	1	1	1	1	M	5	1	1	1
T	6	1	1	1	1	1	T	6	1	1	1

FOCAL LENGTH - 50MM											
OBJECT DISTANCE- 250.FT.(76.20M)											
MAGNIFICATION - .000657											
-6 GROUP LENGTH- .501MM(.0197IN.)											
GROUP											
E	-6	-5	-4	-3	-2	-1	E	-6	-5	-4	-3
L	1	1	1	1	1	1	L	1	1	1	1
E	2	1	1	1	1	1	E	2	1	1	1
M	3	1	1	1	1	1	M	3	1	1	1
E	4	1	1	1	1	1	E	4	1	1	1
M	5	1	1	1	1	1	M	5	1	1	1
T	6	1	1	1	1	1	T	6	1	1	1

FOCAL LENGTH - 50MM												FOCAL LENGTH - 50MM												FOCAL LENGTH - 50MM															
OBJECT DISTANCE - 300.FT. (91.44M)				OBJECT DISTANCE - 400.FT. (121.92M)				OBJECT DISTANCE - 500.FT. (152.40M)				OBJECT DISTANCE - 300.FT. (91.44M)				OBJECT DISTANCE - 400.FT. (121.92M)				OBJECT DISTANCE - 500.FT. (152.40M)				OBJECT DISTANCE - 300.FT. (91.44M)				OBJECT DISTANCE - 400.FT. (121.92M)				OBJECT DISTANCE - 500.FT. (152.40M)							
MAGNIFICATION - .000547				MAGNIFICATION - .000410				MAGNIFICATION - .000328				MAGNIFICATION - .000547				MAGNIFICATION - .000410				MAGNIFICATION - .000328				MAGNIFICATION - .000547				MAGNIFICATION - .000410				MAGNIFICATION - .000328							
-6 GROUP LENGTH - .417MM (.0164IN.)				-6 GROUP LENGTH - .313MM (.0123IN.)				-6 GROUP LENGTH - .250MM (.0099IN.)				-6 GROUP LENGTH - .417MM (.0164IN.)				-6 GROUP LENGTH - .313MM (.0123IN.)				-6 GROUP LENGTH - .250MM (.0099IN.)				-6 GROUP LENGTH - .417MM (.0164IN.)				-6 GROUP LENGTH - .313MM (.0123IN.)				-6 GROUP LENGTH - .250MM (.0099IN.)							
GROUP				GROUP				GROUP				GROUP				GROUP				GROUP				GROUP				GROUP				GROUP				GROUP			
E	-6	-5	-4	-3	-2	-1	E	-6	-5	-4	-3	-2	-1	E	-6	-5	-4	-3	-2	-1	E	-6	-5	-4	-3	-2	-1	E	-6	-5	-4	-3	-2	-1					
L	1	1	1	1	1	1	L	1	1	1	1	1	1	L	1	1	1	1	1	1	L	1	1	1	1	1	L	1	1	1	1	1	1						
E	2	2	2	2	2	2	E	2	2	2	2	2	2	E	2	2	2	2	2	2	E	2	2	2	2	2	E	2	2	2	2	2	2						
M	3	3	3	3	3	3	M	3	3	3	3	3	3	M	3	3	3	3	3	3	M	3	3	3	3	3	M	3	3	3	3	3	3						
E	4	4	4	4	4	4	E	4	4	4	4	4	4	E	4	4	4	4	4	4	E	4	4	4	4	4	E	4	4	4	4	4	4						
M	5	5	5	5	5	5	M	5	5	5	5	5	5	M	5	5	5	5	5	5	M	5	5	5	5	5	M	5	5	5	5	5	5						
T	6	6	6	6	6	6	T	6	6	6	6	6	6	T	6	6	6	6	6	6	T	6	6	6	6	6	T	6	6	6	6	6	6						

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER) FOR 50MM FOCAL LENGTH LENSES

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER) FOR 52MM FOCAL LENGTH LENSES

FOCAL LENGTH - 52MM		FOCAL LENGTH - 52MM		FOCAL LENGTH - 52MM		FOCAL LENGTH - 52MM	
OBJECT DISTANCE -	10. FT. (3.05M)	OBJECT DISTANCE -	15. FT. (4.57M)	OBJECT DISTANCE -	15. FT. (4.57M)	OBJECT DISTANCE -	25. FT. (7.62M)
MAGNIFICATION -	.017354	MAGNIFICATION -	.011504	MAGNIFICATION -	.011504	MAGNIFICATION -	.008871
-6 GROUP LENGTH- GROUP	13.243MM (.5214IN.)	-6 GROUP LENGTH- GROUP	8.778MM (.3456IN.)	-6 GROUP LENGTH- GROUP	8.778MM (.3456IN.)	-6 GROUP LENGTH- GROUP	8.243MM (.3244IN.)
E	-6	-5	-3	-2	-1	-6	-5
L 1	9	1.8	3.6	7.2	14.4	20.8	36.4
E 2	1.0	2.0	4.0	6.1	16.2	32.3	51.7
M 3	1.1	2.3	4.5	9.1	18.1	36.3	58.8
E 4	1.3	2.5	5.1	10.2	20.4	40.7	64.9
M 5	1.4	2.9	5.7	11.4	22.9	45.7	71.8
T 6	1.6	3.2	6.4	12.8	25.7	51.3	82.7

FOCAL LENGTH - 52MM		FOCAL LENGTH - 52MM		FOCAL LENGTH - 52MM		FOCAL LENGTH - 52MM	
OBJECT DISTANCE -	50. FT. (15.24M)	OBJECT DISTANCE -	75. FT. (22.86M)	OBJECT DISTANCE -	75. FT. (22.86M)	OBJECT DISTANCE -	100. FT. (30.48M)
MAGNIFICATION -	.003424	MAGNIFICATION -	.002280	MAGNIFICATION -	.002280	MAGNIFICATION -	.001789
-6 GROUP LENGTH- GROUP	2.612MM (.1028IN.)	-6 GROUP LENGTH- GROUP	1.740MM (.0685IN.)	-6 GROUP LENGTH- GROUP	1.740MM (.0685IN.)	-6 GROUP LENGTH- GROUP	1.384MM (.0543IN.)
E	-6	-5	-3	-2	-1	-6	-5
L 1	4.6	9.1	18.3	36.5	73.0	109.3	163.9
E 2	5.1	10.2	20.5	41.0	82.0	123.0	184.5
M 3	5.7	11.5	23.0	46.0	92.0	138.2	206.5
E 4	6.5	12.9	25.8	51.6	103.3	154.8	228.8
M 5	7.2	14.5	29.0	58.0	115.9	173.6	258.1
T 6	8.1	16.3	32.5	65.1	130.1	190.2	280.2

FOCAL LENGTH - 52MM		FOCAL LENGTH - 52MM		FOCAL LENGTH - 52MM		FOCAL LENGTH - 52MM	
OBJECT DISTANCE -	150. FT. (45.72M)	OBJECT DISTANCE -	200. FT. (60.96M)	OBJECT DISTANCE -	200. FT. (60.96M)	OBJECT DISTANCE -	250. FT. (76.20M)
MAGNIFICATION -	.001139	MAGNIFICATION -	.000854	MAGNIFICATION -	.000854	MAGNIFICATION -	.000683
-6 GROUP LENGTH- GROUP	.869MM (.0342IN.)	-6 GROUP LENGTH- GROUP	.651MM (.0256IN.)	-6 GROUP LENGTH- GROUP	.651MM (.0256IN.)	-6 GROUP LENGTH- GROUP	.521MM (.0205IN.)
E	-6	-5	-3	-2	-1	-6	-5
L 1	13.7	27.4	54.9	109.8	219.6	329.4	494.1
E 2	15.4	30.8	61.6	123.2	246.5	369.8	554.7
M 3	17.3	34.6	69.2	138.3	276.6	414.9	622.5
E 4	19.4	38.8	77.6	155.3	310.5	461.0	692.9
M 5	21.8	43.6	87.1	174.3	348.5	517.1	776.9
T 6	24.5	48.9	97.8	195.6	391.2	582.4	866.9

FOCAL LENGTH - 52MM		FOCAL LENGTH - 52MM		FOCAL LENGTH - 52MM		FOCAL LENGTH - 52MM	
OBJECT DISTANCE -	300. FT. (91.44M)	OBJECT DISTANCE -	400. FT. (121.92M)	OBJECT DISTANCE -	400. FT. (121.92M)	OBJECT DISTANCE -	500. FT. (152.40M)
MAGNIFICATION -	.000569	MAGNIFICATION -	.000427	MAGNIFICATION -	.000427	MAGNIFICATION -	.000341
-6 GROUP LENGTH- GROUP	.434MM (.0171IN.)	-6 GROUP LENGTH- GROUP	.326MM (.0128IN.)	-6 GROUP LENGTH- GROUP	.326MM (.0128IN.)	-6 GROUP LENGTH- GROUP	.266MM (.0103IN.)
E	-6	-5	-3	-2	-1	-6	-5
L 1	27.5	54.9	109.8	219.7	439.4	659.1	988.7
E 2	30.8	61.6	123.2	246.5	493.0	739.5	1109.3
M 3	34.6	69.2	138.3	276.6	553.3	831.0	1246.5
E 4	38.8	77.6	155.3	310.5	621.0	931.0	1399.9
M 5	43.6	87.1	174.3	348.5	697.1	1046.5	1571.8
T 6	48.9	97.8	195.6	391.2	782.4	1174.3	1758.1

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER) FOR 52MM FOCAL LENGTH LENSES

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER) FOR 55MM FOCAL LENGTH LENSES

55MM		55MM		55MM		55MM		55MM	
FOCAL LENGTH -		FOCAL LENGTH -		FOCAL LENGTH -		FOCAL LENGTH -		FOCAL LENGTH -	
OBJECT DISTANCE -		OBJECT DISTANCE -		OBJECT DISTANCE -		OBJECT DISTANCE -		OBJECT DISTANCE -	
MAGNIFICATION -		MAGNIFICATION -		MAGNIFICATION -		MAGNIFICATION -		MAGNIFICATION -	
-6 GROUP LENGTH -		-6 GROUP LENGTH -		-6 GROUP LENGTH -		-6 GROUP LENGTH -		-6 GROUP LENGTH -	
GROUP		GROUP		GROUP		GROUP		GROUP	
E	-5	-3	-1	-6	-5	-3	-1	-6	-5
L 1	1.7	3.6	13.6	27.2	1.3	2.6	5.1	10.3	20.5
E 2	1.0	3.0	7.6	15.1	1.4	2.9	5.0	11.5	23.0
M 3	1.1	4.3	8.6	17.1	1.6	3.2	4.5	12.9	25.9
E 4	1.2	2.4	4.0	9.6	1.8	3.6	7.3	14.5	29.0
M 5	1.3	2.7	5.4	10.8	2.0	4.1	8.1	16.3	32.6
T 6	1.5	3.1	12.1	24.2	2.3	4.6	9.1	18.3	36.6

55MM		55MM		55MM		55MM		55MM	
FOCAL LENGTH -		FOCAL LENGTH -		FOCAL LENGTH -		FOCAL LENGTH -		FOCAL LENGTH -	
OBJECT DISTANCE -		OBJECT DISTANCE -		OBJECT DISTANCE -		OBJECT DISTANCE -		OBJECT DISTANCE -	
MAGNIFICATION -		MAGNIFICATION -		MAGNIFICATION -		MAGNIFICATION -		MAGNIFICATION -	
-6 GROUP LENGTH -		-6 GROUP LENGTH -		-6 GROUP LENGTH -		-6 GROUP LENGTH -		-6 GROUP LENGTH -	
GROUP		GROUP		GROUP		GROUP		GROUP	
E	-5	-3	-1	-6	-5	-3	-1	-6	-5
L 1	3.0	17.3	44.5	99.0	6.5	13.0	25.9	51.8	103.7
E 2	4.0	9.7	19.4	38.8	7.3	14.5	29.1	58.2	116.4
M 3	5.4	10.9	21.7	43.5	8.2	16.3	32.7	65.3	130.6
E 4	7.1	12.2	24.4	48.9	9.2	18.3	36.6	73.3	146.6
M 5	8.8	13.7	27.4	54.9	10.3	20.6	41.1	82.3	164.5
T 6	7.7	14.4	30.7	61.5	11.5	23.1	46.2	92.3	184.7

55MM		55MM		55MM		55MM		55MM	
FOCAL LENGTH -		FOCAL LENGTH -		FOCAL LENGTH -		FOCAL LENGTH -		FOCAL LENGTH -	
OBJECT DISTANCE -		OBJECT DISTANCE -		OBJECT DISTANCE -		OBJECT DISTANCE -		OBJECT DISTANCE -	
MAGNIFICATION -		MAGNIFICATION -		MAGNIFICATION -		MAGNIFICATION -		MAGNIFICATION -	
-6 GROUP LENGTH -		-6 GROUP LENGTH -		-6 GROUP LENGTH -		-6 GROUP LENGTH -		-6 GROUP LENGTH -	
GROUP		GROUP		GROUP		GROUP		GROUP	
E	-5	-3	-1	-6	-5	-3	-1	-6	-5
L 1	13.0	25.9	51.8	103.7	17.3	34.6	69.2	138.4	276.8
E 2	14.6	24.1	48.9	97.8	19.4	38.8	77.7	155.4	310.8
M 3	16.3	12.7	45.4	90.8	21.8	43.6	87.2	174.4	348.8
E 4	18.2	10.7	43.5	87.0	24.5	48.9	97.9	195.8	391.5
M 5	20.0	11.2	42.4	84.7	27.5	54.9	109.9	219.7	439.5
T 6	23.1	12.2	41.1	82.3	30.8	61.7	123.3	246.6	493.3

55MM		55MM		55MM		55MM		55MM	
FOCAL LENGTH -		FOCAL LENGTH -		FOCAL LENGTH -		FOCAL LENGTH -		FOCAL LENGTH -	
OBJECT DISTANCE -		OBJECT DISTANCE -		OBJECT DISTANCE -		OBJECT DISTANCE -		OBJECT DISTANCE -	
MAGNIFICATION -		MAGNIFICATION -		MAGNIFICATION -		MAGNIFICATION -		MAGNIFICATION -	
-6 GROUP LENGTH -		-6 GROUP LENGTH -		-6 GROUP LENGTH -		-6 GROUP LENGTH -		-6 GROUP LENGTH -	
GROUP		GROUP		GROUP		GROUP		GROUP	
E	-5	-3	-1	-6	-5	-3	-1	-6	-5
L 1	20.0	21.4	103.1	207.7	34.6	69.2	138.5	277.0	553.9
E 2	24.1	24.1	116.4	231.1	38.8	77.7	155.4	310.8	621.8
M 3	32.7	25.4	130.4	261.7	43.6	87.2	174.5	349.0	697.9
E 4	36.7	26.7	146.4	291.7	49.0	97.9	195.8	391.7	783.4
M 5	41.2	28.4	164.4	321.7	55.0	109.9	219.7	439.5	879.3
T 6	46.3	32.5	185.4	370.1	61.7	123.3	246.6	493.3	987.0

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER) FOR 55MM FOCAL LENGTH LENSES

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER) FOR 58MM FOCAL LENGTH LENSES

	FOCAL LENGTH -			58MM			25. FT. (7.62M)		
	OBJECT DISTANCE -			0.12849			0.007670		
	MAGNIFICATION -			-0.0044MM (-0.3860IN.)			-0.0044MM (-0.3860IN.)		
	-A GROUP LENGTH-			-A GROUP LENGTH-			-A GROUP LENGTH-		
	GROUP			GROUP			GROUP		
E	-4	-5	-6	-4	-5	-6	-4	-5	-6
L	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
E	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
L	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
E	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
L	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
E	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
L	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
E	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
L	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
E	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
L	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
E	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
L	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
E	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
L	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
E	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
L	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
E	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
L	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
E	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
L	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
E	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
L	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
E	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
L	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
E	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
L	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
E	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
L	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
E	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
L	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
E	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
L	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
E	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
L	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
E	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
L	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
E	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
L	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
E	1.7	1.7	1.7	1.7	1.				

	58MM			58MM		
	75.5FT. (22.66M)			100.FT. (30.48M)		
	-003820			-001987		
	2.415mm (.0764IN.)			1.455MM (.0573IN.)		
FOCAL LENGTH -	58MM	58MM	58MM	FOCAL LENGTH -	58MM	58MM
OBJECT DISTANCE -	75.5FT. (22.66M)	75.5FT. (22.66M)	75.5FT. (22.66M)	OBJECT DISTANCE -	100.FT. (30.48M)	100.FT. (30.48M)
MAGNIFICATION -	-003820	-003820	-003820	MAGNIFICATION -	-001987	-001987
-A GROUP LENGTH-	1.941MM (.0764IN.)	1.941MM (.0764IN.)	1.941MM (.0764IN.)	-B GROUP LENGTH-	1.455MM (.0573IN.)	1.455MM (.0573IN.)
	GROUP	GROUP	GROUP		GROUP	GROUP
	-6	-5	-4		-6	-5
	4.1	4.2	10.0		4.2	10.0
	4.6	9.4	10.0		4.6	9.4
	5.2	10.4	20.6		5.2	10.4
	5.8	11.4	23.0		5.8	11.4
	6.5	13.0	26.0		6.5	13.0
	7.3	14.0	29.2		7.3	14.0
	8.1	15.0	32.8		8.1	15.0
	9.2	16.4	36.8		9.2	16.4
	10.3	17.4	40.4		10.3	17.4
	11.6	18.5	44.6		11.6	18.5
	13.0	19.5	48.4		13.0	19.5
	14.6	20.6	52.0		14.6	20.6
	16.4	21.9	55.4		16.4	21.9
	18.5	23.0	58.2		18.5	23.0
	20.6	24.7	61.3		20.6	24.7
	22.6	26.0	64.3		22.6	26.0
	24.7	27.8	67.3		24.7	27.8
	27.8	29.2	70.4		27.8	29.2
	29.2	30.4	73.6		29.2	30.4
	30.4	31.0	76.6		30.4	31.0
	32.8	32.8	79.5		32.8	32.8
	36.8	34.7	82.5		36.8	34.7
	40.4	36.7	85.2		40.4	36.7
	44.6	38.0	87.6		44.6	38.0
	48.4	39.0	90.1		48.4	39.0
	52.0	40.3	92.7		52.0	40.3
	55.4	41.6	95.4		55.4	41.6
	58.2	42.9	98.1		58.2	42.9
	61.3	44.2	100.8		61.3	44.2
	64.3	45.5	103.5		64.3	45.5
	67.3	46.8	106.2		67.3	46.8
	70.4	48.1	108.9		70.4	48.1
	73.6	49.4	111.6		73.6	49.4
	76.6	50.7	114.3		76.6	50.7
	79.5	52.0	117.0		79.5	52.0
	82.5	53.3	119.7		82.5	53.3
	85.2	54.6	122.4		85.2	54.6
	87.6	55.9	125.1		87.6	55.9
	90.1	57.2	127.8		90.1	57.2
	92.7	58.5	130.5		92.7	58.5
	95.4	59.8	133.2		95.4	59.8
	98.1	61.1	135.9		98.1	61.1
	100.8	62.4	138.6		100.8	62.4
	103.5	63.7	141.3		103.5	63.7
	106.2	65.0	144.0		106.2	65.0
	108.9	66.3	146.7		108.9	66.3
	111.6	67.6	149.4		111.6	67.6
	114.3	68.9	152.1		114.3	68.9
	117.0	70.2	154.8		117.0	70.2
	119.7	71.5	157.5		119.7	71.5

[illegible][illegible]

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER) FOR 60MM FOCAL LENGTH LENSES

60MM				60MM				60MM			
FOCAL LENGTH -				FOCAL LENGTH -				FOCAL LENGTH -			
OBJECT DISTANCE -				OBJECT DISTANCE -				OBJECT DISTANCE -			
MAGNIFICATION -				MAGNIFICATION -				MAGNIFICATION -			
-6 GROUP LENGTH -				-6 GROUP LENGTH -				-6 GROUP LENGTH -			
GROUP				GROUP				GROUP			
E	-6	-5	-4	E	-6	-5	-4	E	-6	-5	-4
L 1	0.8	1.0	1.2	L 1	1.2	2.3	4.7	L 1	2.0	3.9	7.9
E 2	0.9	1.7	3.5	E 2	1.3	2.6	5.3	E 2	2.2	4.4	8.8
M 3	1.0	2.0	3.9	M 3	1.5	3.0	5.9	M 3	2.5	5.0	9.9
E 4	1.1	2.2	4.4	E 4	1.7	3.3	6.6	E 4	2.8	5.6	11.1
M 5	1.2	2.5	4.9	M 5	1.9	3.7	7.5	M 5	3.1	6.3	12.5
T 6	1.4	2.8	5.5	T 6	2.1	4.2	8.4	T 6	3.5	7.0	14.0

60MM				60MM				60MM			
FOCAL LENGTH -				FOCAL LENGTH -				FOCAL LENGTH -			
OBJECT DISTANCE -				OBJECT DISTANCE -				OBJECT DISTANCE -			
MAGNIFICATION -				MAGNIFICATION -				MAGNIFICATION -			
-6 GROUP LENGTH -				-6 GROUP LENGTH -				-6 GROUP LENGTH -			
GROUP				GROUP				GROUP			
E	-6	-5	-4	E	-6	-5	-4	E	-6	-5	-4
L 1	2.8	5.5	11.0	L 1	4.0	7.9	15.8	L 1	5.9	11.9	23.7
E 2	3.1	6.2	12.4	E 2	4.4	8.9	17.7	E 2	6.7	13.3	26.7
M 3	3.5	7.0	13.9	M 3	5.0	10.0	19.9	M 3	7.5	15.0	29.9
E 4	3.9	7.8	15.6	E 4	5.6	11.2	22.4	E 4	8.4	16.8	33.6
M 5	4.4	8.8	17.5	M 5	6.3	12.6	25.1	M 5	9.4	18.9	37.7
T 6	4.9	9.8	19.7	T 6	7.0	14.1	28.2	T 6	10.6	21.2	42.3

60MM				60MM				60MM			
FOCAL LENGTH -				FOCAL LENGTH -				FOCAL LENGTH -			
OBJECT DISTANCE -				OBJECT DISTANCE -				OBJECT DISTANCE -			
MAGNIFICATION -				MAGNIFICATION -				MAGNIFICATION -			
-6 GROUP LENGTH -				-6 GROUP LENGTH -				-6 GROUP LENGTH -			
GROUP				GROUP				GROUP			
E	-6	-5	-4	E	-6	-5	-4	E	-6	-5	-4
L 1	7.9	15.4	31.7	L 1	11.9	23.4	47.6	L 1	15.9	31.7	63.4
E 2	8.9	17.8	35.7	E 2	13.3	26.7	53.4	E 2	17.8	35.6	71.2
M 3	10.0	20.0	39.7	M 3	15.0	30.0	59.9	M 3	20.0	40.0	79.9
E 4	11.2	22.4	44.4	E 4	16.8	33.6	67.3	E 4	22.4	44.9	89.7
M 5	12.6	25.2	50.3	M 5	18.9	37.8	75.5	M 5	25.2	50.4	100.7
T 6	14.1	28.2	56.3	T 6	21.2	42.4	84.7	T 6	28.3	56.5	113.0

60MM				60MM				60MM			
FOCAL LENGTH -				FOCAL LENGTH -				FOCAL LENGTH -			
OBJECT DISTANCE -				OBJECT DISTANCE -				OBJECT DISTANCE -			
MAGNIFICATION -				MAGNIFICATION -				MAGNIFICATION -			
-6 GROUP LENGTH -				-6 GROUP LENGTH -				-6 GROUP LENGTH -			
GROUP				GROUP				GROUP			
E	-6	-5	-4	E	-6	-5	-4	E	-6	-5	-4
L 1	19.4	38.7	77.3	L 1	23.8	47.6	95.2	L 1	31.7	63.5	126.9
E 2	22.3	44.5	88.9	E 2	26.7	53.4	106.8	E 2	35.6	71.2	142.5
M 3	25.0	50.0	99.9	M 3	30.0	60.0	119.9	M 3	40.0	80.0	159.9
E 4	28.0	56.0	112.0	E 4	33.7	67.3	134.6	E 4	44.9	89.8	179.5
M 5	31.5	63.0	126.0	M 5	37.8	75.6	151.0	M 5	50.4	100.8	201.5
T 6	35.3	70.6	141.1	T 6	42.4	84.7	169.5	T 6	56.5	113.1	226.2

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER) FOR 60MM FOCAL LENGTH LENSES

TABLE 1. LINE RESOLUTION (LINES PER MILLIMETER) FOR 63MM FOCAL LENGTH LENSES

[illegible]

	63MM						63MM						63MM						
	FOCAL LENGTH -	OBJECT DISTANCE -	MAGNIFICATION -	-6 GROUP LENGTH -	FOCAL LENGTH -	OBJECT DISTANCE -	MAGNIFICATION -	-6 GROUP LENGTH -	FOCAL LENGTH -	OBJECT DISTANCE -	MAGNIFICATION -	-6 GROUP LENGTH -	FOCAL LENGTH -	OBJECT DISTANCE -	MAGNIFICATION -	-6 GROUP LENGTH -			
	50.FT.(10.67M)	50.FT.(15.24M)	.004151	3.167MM(.1247IN.)	50.FT.(10.67M)	50.FT.(15.24M)	.004151	3.167MM(.1247IN.)	50.FT.(10.67M)	50.FT.(15.24M)	.004151	3.167MM(.1247IN.)	75.FT.(22.86M)	75.FT.(22.86M)	.002764	2.109MM(.0830IN.)			
	FOCAL LENGTH -	OBJECT DISTANCE -	MAGNIFICATION -	-6 GROUP LENGTH -	FOCAL LENGTH -	OBJECT DISTANCE -	MAGNIFICATION -	-6 GROUP LENGTH -	FOCAL LENGTH -	OBJECT DISTANCE -	MAGNIFICATION -	-6 GROUP LENGTH -	FOCAL LENGTH -	OBJECT DISTANCE -	MAGNIFICATION -	-6 GROUP LENGTH -			
	50.FT.(10.67M)	50.FT.(15.24M)	.004151	3.167MM(.1247IN.)	50.FT.(10.67M)	50.FT.(15.24M)	.004151	3.167MM(.1247IN.)	50.FT.(10.67M)	50.FT.(15.24M)	.004151	3.167MM(.1247IN.)	75.FT.(22.86M)	75.FT.(22.86M)	.002764	2.109MM(.0830IN.)			
	FOCAL LENGTH -	OBJECT DISTANCE -	MAGNIFICATION -	-6 GROUP LENGTH -	FOCAL LENGTH -	OBJECT DISTANCE -	MAGNIFICATION -	-6 GROUP LENGTH -	FOCAL LENGTH -	OBJECT DISTANCE -	MAGNIFICATION -	-6 GROUP LENGTH -	FOCAL LENGTH -	OBJECT DISTANCE -	MAGNIFICATION -	-6 GROUP LENGTH -			
	50.FT.(10.67M)	50.FT.(15.24M)	.004151	3.167MM(.1247IN.)	50.FT.(10.67M)	50.FT.(15.24M)	.004151	3.167MM(.1247IN.)	50.FT.(10.67M)	50.FT.(15.24M)	.004151	3.167MM(.1247IN.)	75.FT.(22.86M)	75.FT.(22.86M)	.002764	2.109MM(.0830IN.)			
E 1	-6	-5	-4	-3	-2	-1	E 1	-6	-5	-4	-3	-2	-1	-6	-5	-4	-3	-2	-1
E 2	-6	-5	-4	-3	-2	-1	E 2	-6	-5	-4	-3	-2	-1	-6	-5	-4	-3	-2	-1
E 3	-6	-5	-4	-3	-2	-1	E 3	-6	-5	-4	-3	-2	-1	-6	-5	-4	-3	-2	-1
E 4	-6	-5	-4	-3	-2	-1	E 4	-6	-5	-4	-3	-2	-1	-6	-5	-4	-3	-2	-1
E 5	-6	-5	-4	-3	-2	-1	E 5	-6	-5	-4	-3	-2	-1	-6	-5	-4	-3	-2	-1
E 6	-6	-5	-4	-3	-2	-1	E 6	-6	-5	-4	-3	-2	-1	-6	-5	-4	-3	-2	-1
E 7	-6	-5	-4	-3	-2	-1	E 7 <td>-6</td> <td>-5</td> <td>-4</td> <td>-3</td> <td>-2</td> <td>-1</td> <td>-6</td> <td>-5</td> <td>-4</td> <td>-3</td> <td>-2</td> <td>-1</td>	-6	-5	-4	-3	-2	-1	-6	-5	-4	-3	-2	-1
E 8	-6	-5	-4	-3	-2	-1	E 8 <td>-6</td> <td>-5</td> <td>-4</td> <td>-3</td> <td>-2</td> <td>-1</td> <td>-6</td> <td>-5</td> <td>-4</td> <td>-3</td> <td>-2</td> <td>-1</td>	-6	-5	-4	-3	-2	-1	-6	-5	-4	-3	-2	-1
E 9	-6	-5	-4	-3	-2	-1	E 9 <td>-6</td> <td>-5</td> <td>-4</td> <td>-3</td> <td>-2</td> <td>-1</td> <td>-6</td> <td>-5</td> <td>-4</td> <td>-3</td> <td>-2</td> <td>-1</td>	-6	-5	-4	-3	-2	-1	-6	-5	-4	-3	-2	-1
E 10	-6	-5	-4	-3	-2	-1	E 10 <td>-6</td> <td>-5</td> <td>-4</td> <td>-3</td> <td>-2</td> <td>-1</td> <td>-6</td> <td>-5</td> <td>-4</td> <td>-3</td> <td>-2</td> <td>-1</td>	-6	-5	-4	-3	-2	-1	-6	-5	-4	-3	-2	-1
E 11	-6	-5	-4	-3	-2	-1	E 11 <td>-6</td> <td>-5</td> <td>-4</td> <td>-3</td> <td>-2</td> <td>-1</td> <td>-6</td> <td>-5</td> <td>-4</td> <td>-3</td> <td>-2</td> <td>-1</td>	-6	-5	-4	-3	-2	-1	-6	-5	-4	-3	-2	-1
E 12	-6	-5	-4	-3	-2	-1	E 12 <td>-6</td> <td>-5</td> <td>-4</td> <td>-3</td> <td>-2</td> <td>-1</td> <td>-6</td> <td>-5</td> <td>-4</td> <td>-3</td> <td>-2</td> <td>-1</td>	-6	-5	-4	-3	-2	-1	-6	-5	-4	-3	-2	-1
E 13	-6	-5	-4	-3	-2	-1	E 13 <td>-6</td> <td>-5</td> <td>-4</td> <td>-3</td> <td>-2</td> <td>-1</td> <td>-6</td> <td>-5</td> <td>-4</td> <td>-3</td> <td>-2</td> <td>-1</td>	-6	-5	-4	-3	-2	-1	-6	-5	-4	-3	-2	-1
E 14	-6	-5	-4	-3	-2	-1	E 14 <td>-6</td> <td>-5</td> <td>-4</td> <td>-3</td> <td>-2</td> <td>-1</td> <td>-6</td> <td>-5</td> <td>-4</td> <td>-3</td> <td>-2</td> <td>-1</td>	-6	-5	-4	-3	-2	-1	-6	-5	-4	-3	-2	-1
E 15	-6	-5	-4	-3	-2	-1	E 15 <td>-6</td> <td>-5</td> <td>-4</td> <td>-3</td> <td>-2</td> <td>-1</td> <td>-6</td> <td>-5</td> <td>-4</td> <td>-3</td> <td>-2</td> <td>-1</td>	-6	-5	-4	-3	-2	-1	-6	-5	-4	-3	-2	-1
E 16	-6	-5	-4	-3	-2	-1	E 16 <td>-6</td> <td>-5</td> <td>-4</td> <td>-3</td> <td>-2</td> <td>-1</td> <td>-6</td> <td>-5</td> <td>-4</td> <td>-3</td> <td>-2</td> <td>-1</td>	-6	-5	-4	-3	-2	-1	-6	-5	-4	-3	-2	-1
E 17	-6	-5	-4	-3	-2	-1	E 17 <td>-6</td> <td>-5</td> <td>-4</td> <td>-3</td> <td>-2</td> <td>-1</td> <td>-6</td> <td>-5</td> <td>-4</td> <td>-3</td> <td>-2</td> <td>-1</td>	-6	-5	-4	-3	-2	-1	-6	-5	-4	-3	-2	-1
E 18	-6	-5	-4	-3	-2	-1	E 18 <td>-6</td> <td>-5</td> <td>-4</td> <td>-3</td> <td>-2</td> <td>-1</td> <td>-6</td> <td>-5</td> <td>-4</td> <td>-3</td> <td>-2</td> <td>-1</td>	-6	-5	-4	-3	-2	-1	-6	-5	-4	-3	-2	-1
E 19	-6	-5	-4	-3	-2	-1	E 19 <td>-6</td> <td>-5</td> <td>-4</td> <td>-3</td> <td>-2</td> <td>-1</td> <td>-6</td> <td>-5</td> <td>-4</td> <td>-3</td> <td>-2</td> <td>-1</td>	-6	-5	-4	-3	-2	-1	-6	-5	-4	-3	-2	-1
E 20	-6	-5	-4	-3	-2	-1	E 20 <td>-6</td> <td>-5</td> <td>-4</td> <td>-3</td> <td>-2</td> <td>-1</td> <td>-6</td> <td>-5</td> <td>-4</td> <td>-3</td> <td>-2</td> <td>-1</td>	-6	-5	-4	-3	-2	-1	-6	-5	-4	-3	-2	-1
E 21	-6	-5	-4	-3	-2	-1	E 21 <td>-6</td> <td>-5</td> <td>-4</td> <td>-3</td> <td>-2</td> <td>-1</td> <td>-6</td> <td>-5</td> <td>-4</td> <td>-3</td> <td>-2</td> <td>-1</td>	-6	-5	-4	-3	-2	-1	-6	-5	-4	-3	-2	-1
E 22	-6	-5	-4	-3	-2	-1	E 22 <td>-6</td> <td>-5</td> <td>-4</td> <td>-3</td> <td>-2</td> <td>-1</td> <td>-6</td> <td>-5</td> <td>-4</td> <td>-3</td> <td>-2</td> <td>-1</td>	-6	-5	-4	-3	-2	-1	-6	-5	-4	-3	-2	-1
E 23	-6	-5	-4	-3	-2	-1	E 23 <td>-6</td> <td>-5</td> <td>-4</td> <td>-3</td> <td>-2</td> <td>-1</td> <td>-6</td> <td>-5</td> <td>-4</td> <td>-3</td> <td>-2</td> <td>-1</td>	-6	-5	-4	-3	-2	-1	-6	-5	-4	-3	-2	-1
E 24	-6	-5	-4	-3	-2	-1	E 24 <td>-6</td> <td>-5</td> <td>-4</td> <td>-3</td> <td>-2</td> <td>-1</td> <td>-6</td> <td>-5</td> <td>-4</td> <td>-3</td> <td>-2</td> <td>-1</td>	-6	-5	-4	-3	-2	-1	-6	-5	-4	-3	-2	-1
E 25	-6	-5	-4	-3	-2	-1	E 25 <td>-6</td> <td>-5</td> <td>-4</td> <td>-3</td> <td>-2</td> <td>-1</td> <td>-6</td> <td>-5</td> <td>-4</td> <td>-3</td> <td>-2</td> <td>-1</td>	-6	-5	-4	-3	-2	-1	-6	-5	-4	-3	-2	-1
E 26	-6	-5	-4	-3	-2	-1	E 26 <td>-6</td> <td>-5</td> <td>-4</td> <td>-3</td> <td>-2</td> <td>-1</td> <td>-6</td> <td>-5</td> <td>-4</td> <td>-3</td> <td>-2</td> <td>-1</td>	-6	-5	-4	-3	-2	-1	-6	-5	-4	-3	-2	-1
E 27	-6	-5	-4	-3	-2	-1	E 27 <td>-6</td> <td>-5</td> <td>-4</td> <td>-3</td> <td>-2</td> <td>-1</td> <td>-6</td> <td>-5</td> <td>-4</td> <td>-3</td> <td>-2</td> <td>-1</td>	-6	-5	-4	-3	-2	-1	-6	-5	-4	-3	-2	-1
E 28	-6	-5	-4	-3	-2	-1	E 28 <td>-6</td> <td>-5</td> <td>-4</td> <td>-3</td> <td>-2</td> <td>-1</td> <td>-6</td> <td>-5</td> <td>-4</td> <td>-3</td> <td>-2</td> <td>-1</td>	-6	-5	-4	-3	-2	-1	-6	-5	-4	-3	-2	-1

[illegible][illegible]

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER) FOR 65MM FOCAL LENGTH LENSES

[illegible]

GROUP	FOCAL LENGTH	OBJECT DISTANCE	MAGNIFICATION	65MM	75.FT.(	65MM	75.FT.(
GROUP	FOCAL LENGTH	OBJECT DISTANCE	MAGNIFICATION	65MM	75.FT.(	65MM	75.FT.(
-6	10.2	35.51	0.00130	50.283	15.244	50.283	15.244
-5	11.4	35.51	0.00130	50.283	15.244	50.283	15.244
-4	12.6	35.51	0.00130	50.283	15.244	50.283	15.244
-3	13.8	35.51	0.00130	50.283	15.244	50.283	15.244
-2	15.0	35.51	0.00130	50.283	15.244	50.283	15.244
-1	16.2	35.51	0.00130	50.283	15.244	50.283	15.244
0	17.4	35.51	0.00130	50.283	15.244	50.283	15.244
1	18.6	35.51	0.00130	50.283	15.244	50.283	15.244
2	19.8	35.51	0.00130	50.283	15.244	50.283	15.244
3	21.0	35.51	0.00130	50.283	15.244	50.283	15.244
4	22.2	35.51	0.00130	50.283	15.244	50.283	15.244
5	23.4	35.51	0.00130	50.283	15.244	50.283	15.244
6	24.6	35.51	0.00130	50.283	15.244	50.283	15.244
7	25.8	35.51	0.00130	50.283	15.244	50.283	15.244
8	27.0	35.51	0.00130	50.283	15.244	50.283	15.244
9	28.2	35.51	0.00130	50.283	15.244	50.283	15.244
10	29.4	35.51	0.00130	50.283	15.244	50.283	15.244
11	30.6	35.51	0.00130	50.283	15.244	50.283	15.244
12	31.8	35.51	0.00130	50.283	15.244	50.283	15.244
13	33.0	35.51	0.00130	50.283	15.244	50.283	15.244
14	34.2	35.51	0.00130	50.283	15.244	50.283	15.244
15	35.4	35.51	0.00130	50.283	15.244	50.283	15.244
16	36.6	35.51	0.00130	50.283	15.244	50.283	15.244
17	37.8	35.51	0.00130	50.283	15.244	50.283	15.244
18	39.0	35.51	0.00130	50.283	15.244	50.283	15.244
19	40.2	35.51	0.00130	50.283	15.244	50.283	15.244
20	41.4	35.51	0.00130	50.283	15.244	50.283	15.244
21	42.6	35.51	0.00130	50.283	15.244	50.283	15.244
22	43.8	35.51	0.00130	50.283	15.244	50.283	15.244
23	45.0	35.51	0.00130	50.283	15.244	50.283	15.244
24	46.2	35.51	0.00130	50.283	15.244	50.283	15.244
25	47.4	35.51	0.00130	50.283	15.244	50.283	15.244
26	48.6	35.51	0.00130	50.283	15.244	50.283	15.244
27	49.8	35.51	0.00130	50.283	15.244	50.283	15.244
28	51.0	35.51	0.00130	50.283	15.244	50.283	15.244
29	52.2	35.51	0.00130	50.283	15.244	50.283	15.244
30	53.4	35.51	0.00130	50.283	15.244	50.283	15.244
31	54.6	35.51	0.00130	50.283	15.244	50.283	15.244
32	55.8	35.51	0.00130	50.283	15.244	50.283	15.244
33	57.0	35.51	0.00130	50.283	15.244	50.283	15.244
34	58.2	35.51	0.00130	50.283</			

[illegible]

	65MM				65MM				65MM				
	FOCAL LENGTH		OBJECT DISTANCE		FOCAL LENGTH		OBJECT DISTANCE		FOCAL LENGTH		OBJECT DISTANCE		
	-		-		-		-		-		-		
	MAGNIFICATION		MAGNIFICATION		MAGNIFICATION		MAGNIFICATION		MAGNIFICATION		MAGNIFICATION		
	-		-		-		-		-		-		
	-6 GROUP LENGTH		-6 GROUP LENGTH		-6 GROUP LENGTH		-6 GROUP LENGTH		-6 GROUP LENGTH		-6 GROUP LENGTH		
E 1	18.3	6.7	73.0	18.4	292.4	5.5	7	27.0	43.9	87.9	175.7	351.4	702.9
L 1	20.5	6.1	82.7	18.5	328.7	6.7	4	24.7	49.3	94.6	197.2	394.5	789.0
E 2	23.1	4.1	92.1	20.5	368.7	7.7	9	27.7	55.3	110.7	221.4	442.8	885.6
E 4	25.4	3.4	103.4	21.7	414.1	8.2	4	31.1	62.1	124.3	248.5	497.0	994.0
E 4	29.1	2.7	118.7	23.2	464.4	9.7	9	34.9	69.7	139.5	278.9	557.9	999.9
E 4	32.4	2.2	136.9	25.6	521.4	11.4	6	39.1	78.3	154.5	313.1	626.2	999.9

IMAGE QUALITY RECORDS FOR 11 TIMES BEN MILLZMETEN FOR 60MM FOCAL LENGTH LENSES

FOCAL LENGTH - 80MM				FOCAL LENGTH - 80MM			
OBJECT DISTANCE - 10 FT. (3.05M)				OBJECT DISTANCE - 15 FT. (4.57M)			
MAGNIFICATION - .020454				MAGNIFICATION - .017809			
-6 GROUP LENGTH=20.96MM (.82716.)				-6 GROUP LENGTH=13.58MM (.53501N.)			
GROUP				GROUP			
E	-6	-5	-4	E	-6	-5	-4
L	1	2	3	L	1	2	3
M	7	8	9	M	3	4	5
N	10	11	12	N	6	7	8
O	13	14	15	O	9	10	11
P	16	17	18	P	12	13	14
Q	19	20	21	Q	15	16	17
R	22	23	24	R	18	19	20
S	25	26	27	S	21	22	23
T	28	29	30	T	24	25	26
U	31	32	33	U	27	28	29
V	34	35	36	V	30	31	32
W	37	38	39	W	33	34	35
X	40	41	42	X	36	37	38
Y	43	44	45	Y	39	40	41
Z	46	47	48	Z	42	43	44
AA	49	50	51	AA	45	46	47
AB	52	53	54	AB	48	49	50
AC	55	56	57	AC	51	52	53
AD	58	59	60	AD	54	55	56
AE	61	62	63	AE	57	58	59
AF	64	65	66	AF	60	61	62
AG	67	68	69	AG	63	64	65
AH	70	71	72	AH	66	67	68
AI	73	74	75	AI	69	70	71
AJ	76	77	78	AJ	72	73	74
AK	79	80	81	AK	75	76	77
AL	82	83	84	AL	78	79	80
AM	85	86	87	AM	81	82	83
AN	88	89	90	AN	84	85	86
AO	91	92	93	AO	87	88	89
AP	94	95	96	AP	90	91	92
AQ	97	98	99	AQ	93	94	95
AR	100	101	102	AR	96	97	98
AS	103	104	105	AS	99	100	101
AT	106	107	108	AT	102	103	104
AU	109	110	111	AU	105	106	107
AV	112	113	114	AV	108	109	110
AW	115	116	117	AW	111	112	113
AX	118	119	120	AX	114	115	116
AY	121	122	123	AY	117	118	119
AZ	124	125	126	AZ	120	121	122
BA	127	128	129	BA	123	124	125
BB	130	131	132	BB	126	127	128
BC	133	134	135	BC	129	130	131
BD	136	137	138	BD	132	133	134
BE	139	140	141	BE	135	136	137
BF	142	143	144	BF	138	139	140
BG	145	146	147	BG	141	142	143
BH	148	149	150	BH	144	145	146
BI	151	152	153	BI	147	148	149
BJ	154	155	156	BJ	150	151	152
BK	157	158	159	BK	153	154	155
BL	160	161	162	BL	156	157	158
BM	163	164	165				

	FOCAL LENGTH - 80MM			FOCAL LENGTH - 80MM			FOCAL LENGTH - 80MM		
	OBJECT DISTANCE -	OBJECT DISTANCE -	OBJECT DISTANCE -	OBJECT DISTANCE -	OBJECT DISTANCE -	OBJECT DISTANCE -	OBJECT DISTANCE -	OBJECT DISTANCE -	
	MAGNIFICATION -	MAGNIFICATION -	MAGNIFICATION -	MAGNIFICATION -	MAGNIFICATION -	MAGNIFICATION -	MAGNIFICATION -	MAGNIFICATION -	
	-6 GROUP LENGTH -	-6 GROUP LENGTH -	-6 GROUP LENGTH -	-6 GROUP LENGTH -	-6 GROUP LENGTH -	-6 GROUP LENGTH -	-6 GROUP LENGTH -	-6 GROUP LENGTH -	
E	-6	-3	-1	-6	-3	-1	-6	-3	
L	2.1	15.5	33.1	3.8	5.9	11.8	4.4	8.9	
E	2.3	14.4	37.1	3.3	6.6	13.3	5.0	10.0	
L	2.6	10.8	41.7	3.7	7.5	14.9	5.6	11.2	
E	2.9	11.7	46.4	4.2	8.4	16.7	6.3	12.6	
L	3.3	13.1	52.5	4.7	9.4	18.8	7.1	14.1	
E	3.6	14.3	59.0	5.2	10.4	21.1	7.9	15.9	
L	4.0	15.5	66.2	5.8	11.8	23.7	8.9	17.8	
E	4.3	16.8	73.4	6.4	13.3	26.6	10.0	20.0	
L	4.7	18.1	81.7	7.1	14.9	29.8	11.2	22.4	
E	5.0	19.4	90.0	7.8	16.7	33.5	12.6	25.2	
L	5.4	20.8	99.3	8.6	18.8	37.6	14.1	28.3	
E	5.8	22.1	108.6	9.4	21.1	42.2	15.9	31.7	
L	6.2	23.5	118.9	10.4	23.7	47.4	17.8	35.6	
E	6.6	24.9	129.2	11.8	26.6	53.2	20.0	40.0	
L	7.0	26.3	140.5	13.3	29.8	59.7	22.4	44.8	
E	7.4	27.7	151.8	14.9	33.5	67.0	25.2	50.3	
L	7.8	29.1	164.1	16.7	37.6	75.2	28.3	56.5	
E	8.2	30.5	176.4	18.8	42.2	84.4	31.7	63.4	
L	8.6	31.9	188.7	21.1	47.4	94.8	35.6	71.2	
E	9.0	33.3	201.0	23.7	53.2	106.4	40.0	79.9	
L	9.4	34.7	213.3	26.6	59.7	119.4	44.8	89.7	
E	9.8	36.1	225.6	29.8	67.0	134.0	50.3	100.7	
L	10.2	37.5	237.9	33.5	75.2	150.4	56.5	112.6	
E	10.6	38.9	250.2	37.6	84.4	168.8	63.4	126.8	
L	11.0	40.3	262.5	42.2	94.8	188.2	71.2	142.4	
E	11.4	41.7	274.5	47.4	106.4	208.6	79.9	159.8	
L	11.8	43.1	286.5	53.2	119.4	230.0	89.7	179.4	
E	12.2	44.5	298.5	59.7	134.0	252.4	100.7	201.3	
L	12.6	45.9	310.5	67.0	150.4	275.8	112.6	225.7	
E	13.0	47.3	322.5	75.2	168.8	300.2	126.8	253.7	
L	13.4	48.7	334.5	84.4	188.2	325.6	142.4	283.1	
E	13.8	50.1	346.5	94.8	208.6	352.0	159.8	313.5	
L	14.2	51.5	358.5	106.4	230.0	379.4	179.4	344.9	
E	14.6	52.9	370.5	119.4	252.4	407.8	201.3	376.3	
L	15.0	54.3	382.5	134.0	275.8	437.2	225.7	407.7	
E	15.4	55.7	394.5	150.4	300.2	467.6	253.7	439.1	
L	15.8	57.1	406.5	168.8	325.6	498.0	283.1	470.5	
E	16.2	58.5	418.5	188.2	352.0	528.4	313.5	501.9	
L	16.6	59.9	430.5	208.6	379.4	558.8	344.9	533.3	

[illegible][illegible]

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER) FOR 80MM FOCAL LENGTH LENSES

IMAGE FLARE RESOLUTION (LINES PER MILLIMETER) FOR 65MM FOCAL LENGTH LENSES

[illegible]

	Focal Length = 85MM			Focal Length = 200 FT. (60.96M)		
	Object Distance = 150 FT. (45.72M)			Object Distance = 200 FT. (60.96M)		
	Magnification = .001863			Magnification = .001396		
	-6 GROUP LENGTH = 1.421MM (.0560IN.)			-6 GROUP LENGTH = 1.065MM (.0419IN.)		
	GROUP			GROUP		
	-6	-5	-4	-6	-5	-4
1	5.0	11.2	22.4	11.2	22.4	44.8
2	5.0	11.2	22.4	11.2	22.4	44.8
3	5.0	11.2	22.4	11.2	22.4	44.8
4	5.0	11.2	22.4	11.2	22.4	44.8
5	5.0	11.2	22.4	11.2	22.4	44.8
6	5.0	11.2	22.4	11.2	22.4	44.8
7	5.0	11.2	22.4	11.2	22.4	44.8
8	5.0	11.2	22.4	11.2	22.4	44.8
9	5.0	11.2	22.4	11.2	22.4	44.8
10	5.0	11.2	22.4	11.2	22.4	44.8
11	5.0	11.2	22.4	11.2	22.4	44.8
12	5.0	11.2	22.4	11.2	22.4	44.8
13	5.0	11.2	22.4	11.2	22.4	44.8
14	5.0	11.2	22.4	11.2	22.4	44.8
15	5.0	11.2	22.4	11.2	22.4	44.8
16	5.0	11.2	22.4	11.2	22.4	44.8
17	5.0	11.2	22.4	11.2	22.4	44.8
18	5.0	11.2	22.4	11.2	22.4	44.8
19	5.0	11.2	22.4	11.2	22.4	44.8
20	5.0	11.2	22.4	11.2	22.4	44.8
21	5.0	11.2	22.4	11.2	22.4	44.8
22	5.0	11.2	22.4	11.2	22.4	44.8
23	5.0	11.2	22.4	11.2	22.4	44.8
24	5.0	11.2	22.4	11.2	22.4	44.8
25	5.0	11.2	22.4	11.2	22.4	44.8
26	5.0	11.2	22.4	11.2	22.4	44.8
27	5.0	11.2	22.4	11.2	22.4	44.8
28	5.0	11.2	22.4	11.2	22.4	44.8
29	5.0	11.2	22.4	11.2	22.4	44.8
30	5.0	11.2	22.4	11.2	22.4	44.8
31	5.0	11.2	22.4	11.2	22.4	44.8
32	5.0	11.2	22.4	11.2	22.4	44.8
33	5.0	11.2	22.4	11.2	22.4	44.8
34	5.0	11.2	22.4	11.2	22.4	44.8
35	5.0	11.2	22.4	11.2	22.4	44.8
36	5.0	11.2	22.4	11.2	22.4	44.8
37	5.0	11.2	22.4	11.2	22.4	44.8
38	5.0	11.2	22.4	11.2	22.4	44.8
39	5.0	11.2	22.4	11.2	22.4	44.8
40	5.0	11.2	22.4	11.2	22.4	44.8
41	5.0	11.2	22.4	11.2	22.4	44.8
42	5.0	11.2	22.4	11.2	22.4	44.8
43	5.0	11.2	22.4	11.2	22.4	44.8
44	5.0	11.2	22.4	11.2	22.4	44.8
45	5.0	11.2	22.4	11.2	22.4	44.8
46	5.0	11.2	22.4	11.2	22.4	44.8
47	5.0	11.2	22.4	11.2	22.4	44.8
48	5.0	11.2	22.4	11.2	22.4	44.8
49	5.0	11.2	22.4	11.2	22.4	44.8
50	5.0	11.2	22.4	11.2	22.4	44.8
51	5.0	11.2	22.4	11.2	22.4	4

	85MM				400.FT. (121.92M)				85MM			
	FOCAL LENGTH -		OBJECT DISTANCE -		FOCAL LENGTH -		OBJECT DISTANCE -		FOCAL LENGTH -		OBJECT DISTANCE -	
	MAGNIFICATION -		MAGNIFICATION -		MAGNIFICATION -		MAGNIFICATION -		MAGNIFICATION -		MAGNIFICATION -	
	-6 GROUP LENGTH-		-6 GROUP LENGTH-		-6 GROUP LENGTH-		-6 GROUP LENGTH-		-6 GROUP LENGTH-		-6 GROUP LENGTH-	
	GROUP		GROUP		GROUP		GROUP		GROUP		GROUP	
1	-4	-3	-2	-1	-4	-3	-2	-1	-4	-3	-2	-1
2	10.0	11.0	12.0	13.0	14.0	15.0	16.0	17.0	18.0	19.0	20.0	21.0
3	15.0	16.0	17.0	18.0	19.0	20.0	21.0	22.0	23.0	24.0	25.0	26.0
4	17.0	18.0	19.0	20.0	21.0	22.0	23.0	24.0	25.0	26.0	27.0	28.0
5	19.0	20.0	21.0	22.0	23.0	24.0	25.0	26.0	27.0	28.0	29.0	30.0
6	21.0	22.0	23.0	24.0	25.0	26.0	27.0	28.0	29.0	30.0	31.0	32.0
7	23.0	24.0	25.0	26.0	27.0	28.0	29.0	30.0	31.0	32.0	33.0	34.0
8	25.0	26.0	27.0	28.0	29.0	30.0	31.0	32.0	33.0	34.0	35.0	36.0
9	27.0	28.0	29.0	30.0	31.0	32.0	33.0	34.0	35.0	36.0	37.0	38.0
10	29.0	30.0	31.0	32.0	33.0	34.0	35.0	36.0	37.0	38.0	39.0	40.0

	85MM				85MM			
	FOCAL LENGTH	OBJECT DISTANCE	MAGNIFICATION	-6 GROUP LENGTH	FOCAL LENGTH	OBJECT DISTANCE	MAGNIFICATION	-6 GROUP LENGTH
1	28.0	112.0	0.080	0.080	28.0	112.0	0.080	0.080
2	31.0	125.0	0.070	0.070	31.0	125.0	0.070	0.070
3	35.0	141.0	0.060	0.060	35.0	141.0	0.060	0.060
4	40.0	160.0	0.050	0.050	40.0	160.0	0.050	0.050
5	46.0	185.0	0.040	0.040	46.0	185.0	0.040	0.040
6	54.0	224.0	0.030	0.030	54.0	224.0	0.030	0.030
7	62.0	281.0	0.025	0.025	62.0	281.0	0.025	0.025
8	70.0	356.0	0.020	0.020	70.0	356.0	0.020	0.020
9	80.0	450.0	0.015	0.015	80.0	450.0	0.015	0.015
10	90.0	562.0	0.010	0.010	90.0	562.0	0.010	0.010
11	100.0	700.0	0.008	0.008	100.0	700.0	0.008	0.008
12	110.0	875.0	0.006	0.006	110.0	875.0	0.006	0.006
13	125.0	1125.0	0.005	0.005	125.0	1125.0	0.005	0.005
14	140.0	1400.0	0.004	0.004	140.0	1400.0	0.004	0.004
15	160.0	1760.0	0.003	0.003	160.0	1760.0	0.003	0.003
16	180.0	2250.0	0.002	0.002	180.0	2250.0	0.002	0.002
17	200.0	2800.0	0.002	0.002	200.0	2800.0	0.002	0.002
18	225.0	3562.5	0.001	0.001	225.0	3562.5	0.001	0.001
19	250.0	4500.0	0.001	0.001	250.0	4500.0	0.001	0.001
20	280.0	5620.0	0.001	0.001	280.0	5620.0	0.001	0.001
21	310.0	7000.0	0.001	0.001	310.0	7000.0	0.001	0.001
22	350.0	8750.0	0.001	0.001	350.0	8750.0	0.001	0.001
23	400.0	11250.0	0.001	0.001	400.0	11250.0	0.001	0.001
24	460.0	14000.0	0.001	0.001	460.0	14000.0	0.001	0.001
25	540.0	17600.0	0.001	0.001	540.0	17600.0	0.001	0.001
26	620.0	22500.0	0.001	0.001	620.0	22500.0	0.001	0.001
27	700.0	28000.0	0.001	0.001	700.0	28000.0	0.001	0.001
28	800.0	35600.0	0.001	0.001	800.0	35600.0	0.001	0.001
29	900.0	45000.0	0.001	0.001	900.0	45000.0	0.001	0.001
30	1000.0	56200.0	0.001	0.001	1000.0	56200.0	0.001	0.001
31	1100.0	70000.0	0.001	0.001	1100.0	70000.0	0.001	0.001
32	1250.0	87500.0	0.001	0.001	1250.0	87500.0	0.001	0.001
33	1400.0	112500.0	0.001	0.001	1400.0	112500.0	0.001	0.001
34	1600.0	140000.0	0.001	0.001	1600.0	140000.0	0.001	0.001
35	1800.0	176000.0	0.001	0.001	1800.0	176000.0	0.001	0.001
36	2000.0	225000.0	0.001	0.001	2000.0	225000.0	0.001	0.001
37	2250.0	280000.0	0.001	0.001	2250.0	280000.0	0.001	0.001
38	2500.0	356000.0	0.001	0.001	2500.0			

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER) FOR 65MM FOCAL LENGTH LENSES

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER) FOR 90MM FOCAL LENGTH LENSES

[illegible]

	FOCAL LENGTH	90MM	100.FT.(	30.98M)	FOCAL LENGTH	90MM	200.FT.(	60.96M)		
	OBJECT DISTANCE-				OBJECT DISTANCE-					
	MAGNIFICATION				MAGNIFICATION					
	-6 GROUP LENGTH-	GROUP			-6 GROUP LENGTH-	GROUP				
E 1	-6	-5	-3	-2	-1	-6	-5	-3	-2	-1
L 1	5.3	10.6	21.1	42.2	84.4	148.8	250.0	400.0	600.0	900.0
L 2	5.9	11.8	23.7	47.4	94.9	189.8	299.7	479.6	719.4	1079.1
E 2	6.6	13.2	26.4	52.8	105.8	211.6	338.4	538.2	812.1	1216.0
E 3	7.5	14.9	29.8	59.7	119.4	238.8	379.2	588.4	882.6	1324.9
E 4	8.4	16.8	33.5	67.0	134.0	268.0	422.0	633.0	949.5	1424.3
E 5	9.4	18.8	37.5	75.2	150.4	300.8	451.2	676.8	1015.2	1539.6
E 6	10.4	20.8	41.6	83.2	168.0	336.0	504.0	756.0	1134.0	1704.0
E 7	11.4	22.8	45.8	91.6	186.4	372.8	556.8	835.2	1252.8	1872.0
E 8	12.4	24.8	50.0	100.0	204.8	411.2	609.6	916.8	1371.2	2044.8
E 9	13.4	26.8	54.4	108.8	224.0	448.0	662.4	998.4	1490.4	2222.4
E 10	14.4	28.8	58.4	117.6	243.2	484.8	715.2	1079.2	1609.2	2404.8
E 11	15.4	30.8	62.4	126.4	262.4	521.6	766.4	1158.4	1728.0	2592.0
E 12	16.4	32.8	66.4	135.2	281.6	558.4	817.6	1237.6	1847.2	2784.0
E 13	17.4	34.8	70.4	144.0	300.8	595.2	868.8	1316.8	1966.4	2976.0
E 14	18.4	36.8	74.4	152.8	320.0	632.0	919.2	1396.0	2085.6	3168.0
E 15	19.4	38.8	78.4	161.6	339.2	668.8	970.4	1475.2	2204.8	3360.0
E 16	20.4	40.8	82.4	170.4	358.4	705.6	1020.8	1554.4	2324.0	3552.0
E 17	21.4	42.8	86.4	179.2	377.6	740.8	1071.2	1633.6	2443.2	3744.0
E 18	22.4	44.8	90.4	188.0	396.8	776.0	1121.6	1712.8	2562.4	3936.0
E 19	23.4	46.8	94.4	196.8	416.0	811.2	1172.0	1792.0	2681.6	4128.0
E 20	24.4	48.8	98.4	205.6	435.2	846.4	1222.4	1871.2	2800.8	4320.0
E 21	25.4	50.8	102.4	214.4	454.4	881.6	1272.8	1950.4	2920.0	4512.0
E 22	26.4	52.8	106.4	223.2	473.6	916.8	1323.2	2029.6	3039.2	4704.0
E 23	27.4	54.8	110.4	232.0	492.8	952.0	1373.6	2108.8	3158.4	4896.0
E 24	28.4	56.8	114.4	240.8	512.0	987.2	1424.0	2188.0	3277.6	5088.0
E 25	29.4	58.8	118.4	249.6	531.2	1022.4	1474.4	2267.2	3396.8	5280.0
E 26	30.4	60.8	122.4	258.4	550.4	1057.6	1524.8	2346.4	3516.0	5472.0
E 27	31.4	62.8	126.4	267.2	569.6	1092.8	1575.2	2425.6	3635.2	5664.0
E 28	32.4	64.8	130.4	276.0	588.8	1128.0	1625.6	2504.8	3754.4	5856.0
E 29	33.4	66.8	134.4	284.8	608.0	1163.2	1676.0	2584.0	3873.6	6048.0
E 30	34.4	68.8	138.4	293.6	627.2	1198.4	1726.4	2663.2	3992.8	6240.0
E 31	35.4	70.8	142.4	302.4	646.4	1233.6	1776.8	2742.4	4112.0	6432.0
E 32	36.4	72.8	146.4	311.2	665.6	1268.8	1827.2	2821.6	4231.2	6624.0
E 33										

[illegible][illegible]

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER) FOR 100MM FOCAL LENGTH LENSES

FOCAL LENGTH - 100MM		FOCAL LENGTH - 100MM		FOCAL LENGTH - 100MM		FOCAL LENGTH - 100MM	
OBJECT DISTANCE -	25.FT. (7.62M)	OBJECT DISTANCE -	50.FT. (15.24M)	OBJECT DISTANCE -	75.FT. (22.86M)	OBJECT DISTANCE -	100.FT. (30.48M)
MAGNIFICATION -	.012298	MAGNIFICATION -	.006605	MAGNIFICATION -	.004394	MAGNIFICATION -	.003220
-6 GROUP LENGTH -	10.14MM (.399IN.)	-6 GROUP LENGTH -	5.040MM (.198IN.)	-6 GROUP LENGTH -	3.352MM (.132IN.)	-6 GROUP LENGTH -	2.512MM (.098IN.)
GROUP	GROUP	GROUP	GROUP	GROUP	GROUP	GROUP	GROUP
E	-4	-5	-6	-7	-8	-9	-10
L	1.2	2.3	4.7	9.4	18.4	37.8	75.7
E	1.3	2.4	5.3	10.6	21.1	42.2	84.4
M	1.5	3.0	5.9	11.8	23.7	47.4	94.8
E	1.7	3.3	6.4	12.9	25.8	51.6	103.2
N	1.9	3.7	7.0	14.0	28.0	56.0	112.0
T	2.1	4.2	7.7	15.4	30.8	61.6	123.2

FOCAL LENGTH - 100MM		FOCAL LENGTH - 100MM		FOCAL LENGTH - 100MM		FOCAL LENGTH - 100MM	
OBJECT DISTANCE -	100.FT. (30.48M)	OBJECT DISTANCE -	150.FT. (45.72M)	OBJECT DISTANCE -	200.FT. (60.96M)	OBJECT DISTANCE -	250.FT. (76.20M)
MAGNIFICATION -	.008292	MAGNIFICATION -	.005528	MAGNIFICATION -	.004144	MAGNIFICATION -	.003312
-6 GROUP LENGTH -	2.512MM (.098IN.)	-6 GROUP LENGTH -	1.673MM (.0658IN.)	-6 GROUP LENGTH -	1.254MM (.0494IN.)	-6 GROUP LENGTH -	.940MM (.0370IN.)
GROUP	GROUP	GROUP	GROUP	GROUP	GROUP	GROUP	GROUP
E	-4	-5	-6	-7	-8	-9	-10
L	1.2	2.3	4.7	9.4	18.4	37.8	75.7
E	1.3	2.4	5.3	10.6	21.1	42.2	84.4
M	1.5	3.0	5.9	11.8	23.7	47.4	94.8
E	1.7	3.3	6.4	12.9	25.8	51.6	103.2
N	1.9	3.7	7.0	14.0	28.0	56.0	112.0
T	2.1	4.2	7.7	15.4	30.8	61.6	123.2

FOCAL LENGTH - 100MM		FOCAL LENGTH - 100MM		FOCAL LENGTH - 100MM		FOCAL LENGTH - 100MM	
OBJECT DISTANCE -	250.FT. (76.20M)	OBJECT DISTANCE -	300.FT. (91.44M)	OBJECT DISTANCE -	400.FT. (121.92M)	OBJECT DISTANCE -	500.FT. (152.40M)
MAGNIFICATION -	.003312	MAGNIFICATION -	.002760	MAGNIFICATION -	.002128	MAGNIFICATION -	.001696
-6 GROUP LENGTH -	1.003MM (.0394IN.)	-6 GROUP LENGTH -	.835MM (.0329IN.)	-6 GROUP LENGTH -	.628MM (.0247IN.)	-6 GROUP LENGTH -	.506MM (.0199IN.)
GROUP	GROUP	GROUP	GROUP	GROUP	GROUP	GROUP	GROUP
E	-4	-5	-6	-7	-8	-9	-10
L	1.2	2.3	4.7	9.4	18.4	37.8	75.7
E	1.3	2.4	5.3	10.6	21.1	42.2	84.4
M	1.5	3.0	5.9	11.8	23.7	47.4	94.8
E	1.7	3.3	6.4	12.9	25.8	51.6	103.2
N	1.9	3.7	7.0	14.0	28.0	56.0	112.0
T	2.1	4.2	7.7	15.4	30.8	61.6	123.2

FOCAL LENGTH - 100MM		FOCAL LENGTH - 100MM		FOCAL LENGTH - 100MM		FOCAL LENGTH - 100MM	
OBJECT DISTANCE -	500.FT. (152.40M)	OBJECT DISTANCE -	750.FT. (228.60M)	OBJECT DISTANCE -	1000.FT. (304.80M)	OBJECT DISTANCE -	1500.FT. (457.20M)
MAGNIFICATION -	.001696	MAGNIFICATION -	.001131	MAGNIFICATION -	.000821	MAGNIFICATION -	.000547
-6 GROUP LENGTH -	.506MM (.0199IN.)	-6 GROUP LENGTH -	.357MM (.0140IN.)	-6 GROUP LENGTH -	.254MM (.0100IN.)	-6 GROUP LENGTH -	.169MM (.0067IN.)
GROUP	GROUP	GROUP	GROUP	GROUP	GROUP	GROUP	GROUP
E	-4	-5	-6	-7	-8	-9	-10
L	1.2	2.3	4.7	9.4	18.4	37.8	75.7
E	1.3	2.4	5.3	10.6	21.1	42.2	84.4
M	1.5	3.0	5.9	11.8	23.7	47.4	94.8
E	1.7	3.3	6.4	12.9	25.8	51.6	103.2
N	1.9	3.7	7.0	14.0	28.0	56.0	112.0
T	2.1	4.2	7.7	15.4	30.8	61.6	123.2

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER) FOR 100MM FOCAL LENGTH LENSES

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER) FOR 105MM FOCAL LENGTH LENSES

105MM				105MM				105MM			
FOCAL LENGTH -				FOCAL LENGTH -				FOCAL LENGTH -			
OBJECT DISTANCE -				OBJECT DISTANCE -				OBJECT DISTANCE -			
MAGNIFICATION -				MAGNIFICATION -				MAGNIFICATION -			
-6 GROUP LENGTH-10.651MM (.1971IN.)				-6 GROUP LENGTH-5.293MM (.2084IN.)				-6 GROUP LENGTH-3.521MM (.1381IN.)			
GROUP	-4	-3	-2	GROUP	-4	-3	-2	GROUP	-4	-3	-2
E	-6	-5	-4	E	-6	-5	-4	E	-6	-5	-4
L 1	1.1	2.2	4.5	L 1	2.3	4.5	9.0	L 1	3.4	6.8	13.5
L 2	1.3	2.5	5.0	L 2	2.5	5.1	10.1	L 2	3.8	7.6	15.2
M 3	1.4	2.8	5.6	M 3	2.8	5.7	11.4	M 3	4.3	8.5	17.1
E 4	1.6	3.2	6.3	E 4	3.2	6.4	12.7	E 4	4.8	9.6	19.2
M 5	1.8	3.6	7.1	M 5	3.6	7.2	14.3	M 5	5.4	10.8	21.5
T 6	2.0	4.0	8.0	T 6	4.0	8.0	16.1	T 6	6.0	12.1	24.1

105MM				105MM				105MM			
FOCAL LENGTH -				FOCAL LENGTH -				FOCAL LENGTH -			
OBJECT DISTANCE -				OBJECT DISTANCE -				OBJECT DISTANCE -			
MAGNIFICATION -				MAGNIFICATION -				MAGNIFICATION -			
-6 GROUP LENGTH-2.638MM (.1034IN.)				-6 GROUP LENGTH-1.756MM (.0691IN.)				-6 GROUP LENGTH-1.316MM (.0518IN.)			
GROUP	-4	-3	-2	GROUP	-4	-3	-2	GROUP	-4	-3	-2
E	-6	-5	-4	E	-6	-5	-4	E	-6	-5	-4
L 1	4.5	9.0	18.1	L 1	6.8	13.6	27.2	L 1	9.1	18.1	36.2
L 2	5.1	10.1	20.3	L 2	7.6	15.2	30.5	L 2	10.2	20.3	40.7
M 3	5.7	11.4	22.8	M 3	8.6	17.1	34.2	M 3	11.4	22.8	45.6
E 4	6.4	12.8	25.6	E 4	9.6	19.2	38.4	E 4	12.8	25.6	51.2
M 5	7.2	14.4	28.7	M 5	10.8	21.6	43.1	M 5	14.4	28.8	57.5
T 6	8.1	16.1	32.2	T 6	12.1	24.2	48.4	T 6	16.1	32.3	64.5

105MM				105MM				105MM			
FOCAL LENGTH -				FOCAL LENGTH -				FOCAL LENGTH -			
OBJECT DISTANCE -				OBJECT DISTANCE -				OBJECT DISTANCE -			
MAGNIFICATION -				MAGNIFICATION -				MAGNIFICATION -			
-6 GROUP LENGTH-1.053MM (.0414IN.)				-6 GROUP LENGTH-.877MM (.0345IN.)				-6 GROUP LENGTH-.658MM (.0259IN.)			
GROUP	-4	-3	-2	GROUP	-4	-3	-2	GROUP	-4	-3	-2
E	-6	-5	-4	E	-6	-5	-4	E	-6	-5	-4
L 1	11.3	22.6	45.3	L 1	13.6	27.2	54.4	L 1	18.1	36.3	72.5
L 2	12.7	25.4	50.8	L 2	15.3	30.5	61.0	L 2	20.3	40.7	81.4
M 3	14.3	28.5	57.1	M 3	17.1	34.2	68.5	M 3	22.8	45.7	91.4
E 4	16.0	32.0	64.1	E 4	19.2	38.4	76.8	E 4	25.6	51.3	102.5
M 5	18.0	36.0	71.9	M 5	21.6	43.2	86.3	M 5	28.8	57.6	115.1
T 6	20.2	40.4	80.7	T 6	24.2	48.4	96.9	T 6	32.3	64.6	129.2

105MM				105MM				105MM			
FOCAL LENGTH -				FOCAL LENGTH -				FOCAL LENGTH -			
OBJECT DISTANCE -				OBJECT DISTANCE -				OBJECT DISTANCE -			
MAGNIFICATION -				MAGNIFICATION -				MAGNIFICATION -			
-6 GROUP LENGTH-.528MM (.0207IN.)				-6 GROUP LENGTH-.351MM (.0138IN.)				-6 GROUP LENGTH-.263MM (.0104IN.)			
GROUP	-4	-3	-2	GROUP	-4	-3	-2	GROUP	-4	-3	-2
E	-6	-5	-4	E	-6	-5	-4	E	-6	-5	-4
L 1	22.7	45.3	90.7	L 1	34.0	68.0	136.0	L 1	45.3	90.7	181.4
L 2	25.4	50.9	101.8	L 2	38.2	76.3	152.7	L 2	50.9	101.8	203.6
M 3	28.6	57.1	114.2	M 3	42.8	85.7	171.4	M 3	57.1	114.2	228.5
E 4	32.0	64.1	128.2	E 4	48.1	96.2	192.3	E 4	64.1	128.2	256.5
M 5	36.0	72.0	143.9	M 5	54.0	108.0	215.9	M 5	72.0	144.0	287.9
T 6	40.4	80.8	161.5	T 6	60.6	121.2	242.3	T 6	80.8	161.6	323.2

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER) FOR 105MM FOCAL LENGTH LENSES

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER) FOR 120MM FOCAL LENGTH LENSES

120MM		120MM		120MM		120MM	
FOCAL LENGTH	-	FOCAL LENGTH	-	FOCAL LENGTH	-	FOCAL LENGTH	-
OBJECT DISTANCE-	25.0 FT. (7.62M)	OBJECT DISTANCE-	50.0 FT. (15.24M)	OBJECT DISTANCE-	75.0 FT. (22.86M)	OBJECT DISTANCE-	100.0 FT. (30.48M)
MAGNIFICATION-	.0016000	MAGNIFICATION-	.007937	MAGNIFICATION-	.0056MM (.0238IN.)	MAGNIFICATION-	.003394
-6 GROUP LENGTH-	12.20MM (.4804IN.)	-6 GROUP LENGTH-	6.056MM (.2384IN.)	-6 GROUP LENGTH-	4.026MM (.1585IN.)	-6 GROUP LENGTH-	3.01MM (.1181IN.)
GROUP		GROUP		GROUP		GROUP	
-4	-5	-4	-5	-4	-5	-4	-5
-3	-2	-3	-2	-3	-2	-3	-2
-2	-1	-2	-1	-2	-1	-2	-1
-1	0	-1	0	-1	0	-1	0
0	1	0	1	0	1	0	1
1	2	1	2	1	2	1	2
2	3	2	3	2	3	2	3
3	4	3	4	3	4	3	4
4	5	4	5	4	5	4	5
5	6	5	6	5	6	5	6
6	7	6	7	6	7	6	7
7	8	7	8	7	8	7	8
8	9	8	9	8	9	8	9
9	10	9	10	9	10	9	10
10	11	10	11	10	11	10	11
11	12	11	12	11	12	11	12
12	13	12	13	12	13	12	13
13	14	13	14	13	14	13	14
14	15	14	15	14	15	14	15
15	16	15	16	15	16	15	16
16	17	16	17	16	17	16	17
17	18	17	18	17	18	17	18
18	19	18	19	18	19	18	19
19	20	19	20	19	20	19	20
20	21	20	21	20	21	20	21
21	22	21	22	21	22	21	22
22	23	22	23	22	23	22	23
23	24	23	24	23	24	23	24
24	25	24	25	24	25	24	25
25	26	25	26	25	26	25	26
26	27	26	27	26	27	26	27
27	28	27	28	27	28	27	28
28	29	28	29	28	29	28	29
29	30	29	30	29	30	29	30
30	31	30	31	30	31	30	31
31	32	31	32	31	32	31	32
32	33	32	33	32	33	32	33
33	34	33	34	33	34	33	34
34	35	34	35	34	35	34	35
35	36	35	36	35	36	35	36
36	37	36	37	36	37	36	37
37	38	37	38	37	38	37	38
38	39	38	39	38	39	38	39
39	40	39	40	39	40	39	40
40	41	40	41	40	41	40	41
41	42	41	42	41	42	41	42
42	43	42	43	42	43	42	43
43	44	43	44	43	44	43	44
44	45	44	45	44	45	44	45
45	46	45	46	45	46	45	46
46	47	46	47	46	47	46	47
47	48	47	48	47	48	47	48
48	49	48	49	48	49	48	49
49	50	49	50	49	50	49	50
50	51	50	51	50	51	50	51
51	52	51	52	51	52	51	52
52	53	52	53	52	53	52	53
53	54	53	54	53	54	53	54
54	55	54	55	54	55	54	55
55	56	55	56	55	56	55	56
56	57	56	57	56	57	56	57
57	58	57	58	57	58	57	58
58	59	58	59	58	59	58	59
59	60	59	60	59	60	59	60
60	61	60	61	60	61	60	61
61	62	61	62	61	62	61	62
62	63	62	63	62	63	62	63
63	64	63	64	63	64	63	64
64	65	64	65	64	65	64	65
65	66	65	66	65	66	65	66
66	67	66	67	66	67	66	67
67	68	67	68	67	68	67	68
68	69	68	69	68	69	68	69
69	70	69	70	69	70	69	70
70	71	70	71	70	71	70	71
71	72	71	72	71	72	71	72
72	73	72	73	72	73	72	73
73	74	73	74	73	74	73	74
74	75	74	75	74	75	74	75
75	76	75	76	75	76	75	76
76	77	76	77	76	77	76	77
77	78	77	78	77	78	77	78
78	79	78	79	78	79	78	79
79	80	79	80	79	80	79	80
80	81	80	81	80	81	80	81
81	82	81	82	81	82	81	82
82	83	82	83	82	83	82	83
83	84	83	84	83	84	83	84
84	85	84	85	84	85	84	85
85	86	85	86	85	86	85	86
86	87	86	87	86	87	86	87
87	88	87	88	87	88	87	88
88	89	88	89	88	89	88	89
89	90	89	90	89	90	89	90
90	91	90	91	90	91	90	91
91	92	91	92	91	92	91	92
92	93	92	93	92	93	92	93
93	94	93	94	93	94	93	94
94	95	94	95	94	95	94	95
95	96	95	96	95	96	95	96
96	97	96	97	96	97	96	97
97	98	97	98	97	98	97	98
98	99	98	99	98	99	98	99
99	100	99	100	99	100	99	100
100	101	100	101	100	101	100	101
101	102	101	102	101	102	101	102
102	103	102	103	102	103	102	103
103	104	103	104	103	104	103	104
104	105	104	105	104	105	104	105
105	106	105	106	105	106	105	106
106	107	106	107	106	107	106	107
107	108	107	108	107	108	107	108
108	109	108	109	108	109	108	109
109	110	109	110	109	110	109	110
110	111	110	111	110	111	110	111
111	112	111	112	111	112	111	112
112	113	112	113	112	113	112	113
113	114	113	114	113	114	113	114
114	115	114	115	114	115	114	115
115	116	115	116	115	116	115	116
116	117	116	117	116	117	116	117
117	118	117	118	117	118	117	118
118	119	118	119	118	119	118	119
119	120	119	120	119	120	119	120
120	121	120	121	120	121	120	121
121	122	121	122	121	122	121	122
122	123	122	123	122	123	122	123
123	124	123	124	123	124	123	124
124	125	124	125	124	125	124	125
125	126	125	126	125	126	125	126
126	127	126	127	126	127	126	127
127	128	127	128	127	128	127	128
128	129	128	129	128	129	128	129
129	130	129	130	129	130	129	130
130	131	130	131	130	131	130	131
131	132	131	132	131	132	131	132
132	133	132	133	132	133	132	133
133	134	133	134	133	134	133	134
134	135	134	135	134	135	134	135
135	136	135	136	135	136	135	136
136	137	136	137	136	137	136	137
137	138	137	138	137	138	137	138
138	139	138	139	138	139	138	139
139	140	139	140	139	140	139	140
140	141	140	141	140	141	140	141
141	142	141	142	141	142	141	142
142	143	142	143	142	143	142	143
143	144	143	144	143	144	143	144
144	145	144	145	144	145	144	145
145	146	145	146	145	146	145	146
146	147	146	147	146	147	146	147
147	148	147	148	147	148	147	148
148	149	148	149	148	149	148	149
149	150	149	150	149	150	149	150
150	151	150	151	150	151	150	151
151	152	151	152	151	152	151	152
152	153	152	153	152	153	152	153
153	154	153	154	153	154	153	154
154	155	154	155	154	155	154	155
155	156	155	156	155	156	155	156
156	157	156	157	156	157	156	157
157	158	157	158	157	158	157	158
158	159	158	159	158	159	158	159
159	160	159	160	159	160	159	160
160	161	160	161	160	161	160	161
161	162	161	162	161	162	161	162
162	163	162	163	162	163	162	163
163	164	163	164	163	164	163	164
164	165	164	165	164	165	164	165
165	166	165	166	165	166	165	166
166	167	166	167	166	167	166	167
167	168	167	168	167	168	167	168
168	169	168	169	168	169	168	169
169	170	169	170	169	170	169	170
170	171	170	171	170	171	170	171
171	172	171	172	171	172	171	172
172	173	172	173	172	173	172	173
173	174	173	174	173	174	173	174
174	175	174	175	174	175	174	175
175	176	175	176	175	176	175	176
176	177	176	177	176	177	176	177
177	178						

IMAGE PLATE RESOLUTION (LINES PER MILLIMETER) FOR 127MM FOCAL LENGTH LENSES

[illegible][illegible][illegible][illegible]

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER) FOR 135MM FOCAL LENGTH LENSES

FOCAL LENGTH - 135MM				FOCAL LENGTH - 135MM				FOCAL LENGTH - 135MM					
OBJECT DISTANCE -		25.0 FT. (7.62M)		OBJECT DISTANCE -		50.0 FT. (15.24M)		OBJECT DISTANCE -		75.0 FT. (22.86M)			
MAGNIFICATION -		.010036		MAGNIFICATION -		.006937		MAGNIFICATION -		.005941			
-6 GROUP LENGTH -		13.742MM (.441IN.)		-6 GROUP LENGTH -		6.819MM (.2685IN.)		-6 GROUP LENGTH -		4.533MM (.1785IN.)			
GROUP		GROUP		GROUP		GROUP		GROUP		GROUP			
E	-6	-5	-4	-6	-5	-4	-3	-2	-1	E	-3	-2	-1
L 1	1.7	1.7	3.5	7.0	1.7	3.5	7.0	14.0	28.0	L 1	2.6	5.3	10.5
L 2	1.0	1.0	3.9	7.8	2.0	3.9	7.8	15.7	31.4	L 2	3.0	5.9	11.8
M 1	1.1	2.2	4.4	8.8	2.2	4.4	8.8	17.6	35.2	M 2	3.3	6.6	13.3
E 4	1.2	2.5	4.9	9.9	2.5	4.9	9.9	19.8	39.6	E 4	3.7	7.4	14.9
N 5	1.4	2.8	5.6	11.1	2.8	5.6	11.1	22.2	44.4	N 5	4.2	8.4	16.7
T 6	1.5	3.1	6.2	12.5	3.1	6.2	12.5	24.9	49.8	T 6	4.7	9.4	18.7

FOCAL LENGTH - 135MM				FOCAL LENGTH - 135MM				FOCAL LENGTH - 135MM				FOCAL LENGTH - 135MM			
OBJECT DISTANCE -		100.0 FT. (30.48M)		OBJECT DISTANCE -		150.0 FT. (45.72M)		OBJECT DISTANCE -		200.0 FT. (60.96M)		OBJECT DISTANCE -		250.0 FT. (76.20M)	
MAGNIFICATION -		.004449		MAGNIFICATION -		.002962		MAGNIFICATION -		.002219		MAGNIFICATION -		.001774	
-6 GROUP LENGTH -		3.594MM (.1334IN.)		-6 GROUP LENGTH -		2.260MM (.0890IN.)		-6 GROUP LENGTH -		1.693MM (.0667IN.)		-6 GROUP LENGTH -		1.270MM (.0500IN.)	
GROUP		GROUP		GROUP		GROUP		GROUP		GROUP		GROUP		GROUP	
E	-6	-5	-4	-6	-5	-4	-6	-5	-4	-6	-5	-4	-6	-5	-4
L 1	3.5	7.0	14.0	28.0	5.3	10.6	21.1	42.2	84.4	168.8	337.6	675.2	1350.4	2700.8	5401.6
L 2	3.9	7.9	15.4	30.8	5.9	11.8	23.7	47.4	94.8	189.5	379.0	758.0	1516.0	3032.0	6064.0
M 1	4.4	8.8	17.7	35.4	6.6	13.3	26.6	53.2	106.4	212.7	425.4	850.8	1701.6	3403.2	6806.4
E 4	5.0	9.9	19.8	39.6	7.5	14.9	29.8	59.7	119.4	238.8	477.6	955.2	1910.4	3820.8	7641.6
N 5	5.6	11.2	22.4	44.7	8.4	16.8	33.6	67.0	134.0	268.0	536.0	1072.0	2144.0	4288.0	8576.0
T 6	6.3	12.5	25.1	50.2	9.4	18.8	37.6	75.2	150.4	300.8	601.6	1203.2	2406.4	4812.8	9625.6

FOCAL LENGTH - 135MM				FOCAL LENGTH - 135MM				FOCAL LENGTH - 135MM				FOCAL LENGTH - 135MM			
OBJECT DISTANCE - 250.0 FT. (76.20M)				OBJECT DISTANCE - 300.0 FT. (91.44M)				OBJECT DISTANCE - 400.0 FT. (121.92M)				OBJECT DISTANCE - 400.0 FT. (121.92M)			
MAGNIFICATION - .001175				MAGNIFICATION - .001479				MAGNIFICATION - .001109				MAGNIFICATION - .001109			
-6 GROUP LENGTH - 1.354MM (.0533IN.)				-6 GROUP LENGTH - 1.128MM (.0444IN.)				-6 GROUP LENGTH - .846MM (.0333IN.)				-6 GROUP LENGTH - .846MM (.0333IN.)			
GROUP				GROUP				GROUP				GROUP			
E	-6	-5	-4	E	-6	-5	-4	E	-6	-5	-4	E	-6	-5	-4
L 1	8.8	17.6	35.2	L 1	10.6	21.1	42.2	L 1	14.1	28.2	56.4	L 1	14.1	28.2	56.4
L 2	9.9	19.8	39.6	L 2	11.9	23.7	47.4	L 2	15.8	31.6	63.0	L 2	15.8	31.6	63.0
M 3	11.1	22.2	44.4	M 3	13.3	26.6	53.2	M 3	17.8	35.5	71.0	M 3	17.8	35.5	71.0
E 4	12.5	25.0	50.0	E 4	14.9	29.8	59.8	E 4	19.9	39.9	79.7	E 4	19.9	39.9	79.7
N 5	14.0	28.0	56.0	N 5	16.8	33.6	67.1	N 5	22.4	44.8	89.5	N 5	22.4	44.8	89.5
T 6	15.7	31.4	62.7	T 6	18.8	37.6	75.2	T 6	25.4	50.7	101.4	T 6	25.4	50.7	101.4

FOCAL LENGTH - 135MM				FOCAL LENGTH - 135MM				FOCAL LENGTH - 135MM				FOCAL LENGTH - 135MM			
OBJECT DISTANCE- 500.FT.(152.40M)				OBJECT DISTANCE- 750.FT.(228.60M)				OBJECT DISTANCE- 1000.FT.(304.80M)				OBJECT DISTANCE- 1000.FT.(304.80M)			
MAGNIFICATION- .000587				MAGNIFICATION- .000591				MAGNIFICATION- .000591				MAGNIFICATION- .000443			
-6 GROUP LENGTH- .676MM(.0266IN.)				-6 GROUP LENGTH- .451MM(.0178IN.)				-6 GROUP LENGTH- .451MM(.0178IN.)				-6 GROUP LENGTH- .338MM(.0133IN.)			
GROUP				GROUP				GROUP				GROUP			
E	-6	-5	-4	E	-6	-5	-4	E	-6	-5	-4	E	-6	-5	-4
L 1	17.6	35.2	70.5	L 1	26.4	52.9	105.8	L 1	35.3	70.5	141.0	L 1	35.3	70.5	141.0
L 2	19.8	39.6	79.2	L 2	29.7	59.4	118.7	L 2	39.6	79.2	158.3	L 2	39.6	79.2	158.3
M 1	22.2	44.4	88.8	M 1	33.3	66.6	133.3	M 1	44.4	88.9	177.7	M 1	44.4	88.9	177.7
E 4	24.9	49.8	99.7	E 4	37.4	74.8	149.6	E 4	44.9	99.7	199.5	E 4	44.9	99.7	199.5
N 5	28.0	56.0	112.0	N 5	42.0	84.0	167.9	N 5	56.0	112.0	223.9	N 5	56.0	112.0	223.9
T 6	31.4	62.8	125.6	T 6	47.1	94.2	188.5	T 6	62.8	125.7	251.3	T 6	62.8	125.7	251.3

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER) FOR 135MM FOCAL LENGTH LENSES

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER) FOR 150MM FOCAL LENGTH LENSES

		150MM		150MM		150MM		150MM	
		FOCAL LENGTH	OBJECT DISTANCE	FOCAL LENGTH	OBJECT DISTANCE	FOCAL LENGTH	OBJECT DISTANCE	FOCAL LENGTH	OBJECT DISTANCE
		50.0 FT. (15.24M)	75.0 FT. (22.86M)	75.0 FT. (22.86M)	100.0 FT. (30.48M)	100.0 FT. (30.48M)	150.0 FT. (45.72M)	150.0 FT. (45.72M)	200.0 FT. (60.96M)
		MAGNIFICATION	MAGNIFICATION	MAGNIFICATION	MAGNIFICATION	MAGNIFICATION	MAGNIFICATION	MAGNIFICATION	MAGNIFICATION
		-6 GROUP LENGTH	-6 GROUP LENGTH	-6 GROUP LENGTH	-6 GROUP LENGTH	-6 GROUP LENGTH	-6 GROUP LENGTH	-6 GROUP LENGTH	-6 GROUP LENGTH
		GROUP	GROUP	GROUP	GROUP	GROUP	GROUP	GROUP	GROUP
		-6	-5	-4	-3	-2	-1	0	1
		1.6	3.1	6.3	12.6	25.2	50.5	101.1	151.7
		1.8	3.5	7.1	14.1	28.2	56.4	112.8	179.2
		2.0	4.0	8.0	16.0	32.0	64.0	128.0	192.0
		2.2	4.4	8.8	17.6	35.2	70.4	140.8	211.2
		2.5	5.0	10.0	20.0	40.0	80.0	160.0	240.0
		2.8	5.6	11.2	22.4	44.8	89.6	179.2	268.8
		E	L	M	N	T			

		150MM		150MM		150MM		150MM	
		FOCAL LENGTH	OBJECT DISTANCE	FOCAL LENGTH	OBJECT DISTANCE	FOCAL LENGTH	OBJECT DISTANCE	FOCAL LENGTH	OBJECT DISTANCE
		50.0 FT. (15.24M)	75.0 FT. (22.86M)	75.0 FT. (22.86M)	100.0 FT. (30.48M)	100.0 FT. (30.48M)	150.0 FT. (45.72M)	150.0 FT. (45.72M)	200.0 FT. (60.96M)
		MAGNIFICATION	MAGNIFICATION	MAGNIFICATION	MAGNIFICATION	MAGNIFICATION	MAGNIFICATION	MAGNIFICATION	MAGNIFICATION
		-6 GROUP LENGTH	-6 GROUP LENGTH	-6 GROUP LENGTH	-6 GROUP LENGTH	-6 GROUP LENGTH	-6 GROUP LENGTH	-6 GROUP LENGTH	-6 GROUP LENGTH
		GROUP	GROUP	GROUP	GROUP	GROUP	GROUP	GROUP	GROUP
		-6	-5	-4	-3	-2	-1	0	1
		4.7	9.5	19.0	38.0	76.0	152.0	304.0	456.0
		5.3	10.7	21.3	42.6	85.2	170.4	340.8	511.2
		6.0	12.0	24.0	48.0	96.0	192.0	384.0	576.0
		6.7	13.4	26.8	53.6	107.2	214.4	428.8	643.2
		7.5	15.1	30.1	60.2	120.4	240.8	481.6	722.4
		8.5	17.0	34.0	68.0	136.0	272.0	544.0	816.0
		E	L	M	N	T			

		150MM		150MM		150MM		150MM	
		FOCAL LENGTH	OBJECT DISTANCE	FOCAL LENGTH	OBJECT DISTANCE	FOCAL LENGTH	OBJECT DISTANCE	FOCAL LENGTH	OBJECT DISTANCE
		50.0 FT. (15.24M)	75.0 FT. (22.86M)	75.0 FT. (22.86M)	100.0 FT. (30.48M)	100.0 FT. (30.48M)	150.0 FT. (45.72M)	150.0 FT. (45.72M)	200.0 FT. (60.96M)
		MAGNIFICATION	MAGNIFICATION	MAGNIFICATION	MAGNIFICATION	MAGNIFICATION	MAGNIFICATION	MAGNIFICATION	MAGNIFICATION
		-6 GROUP LENGTH	-6 GROUP LENGTH	-6 GROUP LENGTH	-6 GROUP LENGTH	-6 GROUP LENGTH	-6 GROUP LENGTH	-6 GROUP LENGTH	-6 GROUP LENGTH
		GROUP	GROUP	GROUP	GROUP	GROUP	GROUP	GROUP	GROUP
		-6	-5	-4	-3	-2	-1	0	1
		12.7	25.4	50.7	101.5	203.0	406.0	812.0	1218.0
		14.2	28.5	57.0	114.0	228.0	456.0	912.0	1368.0
		16.0	32.0	64.0	128.0	256.0	512.0	1024.0	1536.0
		17.9	35.9	71.8	143.5	287.0	574.0	1148.0	1722.0
		20.1	40.3	80.5	161.0	322.0	644.0	1288.0	1932.0
		22.6	45.2	90.4	180.8	361.6	723.2	1446.4	2169.6
		E	L	M	N	T			

		150MM		150MM		150MM		150MM	
		FOCAL LENGTH	OBJECT DISTANCE	FOCAL LENGTH	OBJECT DISTANCE	FOCAL LENGTH	OBJECT DISTANCE	FOCAL LENGTH	OBJECT DISTANCE
		100.0 FT. (30.48M)	150.0 FT. (45.72M)	150.0 FT. (45.72M)	200.0 FT. (60.96M)	200.0 FT. (60.96M)	250.0 FT. (76.20M)	250.0 FT. (76.20M)	300.0 FT. (91.44M)
		MAGNIFICATION	MAGNIFICATION	MAGNIFICATION	MAGNIFICATION	MAGNIFICATION	MAGNIFICATION	MAGNIFICATION	MAGNIFICATION
		-6 GROUP LENGTH	-6 GROUP LENGTH	-6 GROUP LENGTH	-6 GROUP LENGTH	-6 GROUP LENGTH	-6 GROUP LENGTH	-6 GROUP LENGTH	-6 GROUP LENGTH
		GROUP	GROUP	GROUP	GROUP	GROUP	GROUP	GROUP	GROUP
		-6	-5	-4	-3	-2	-1	0	1
		31.7	63.5	126.9	253.9	507.9	1015.8	2031.6	3047.4
		35.6	71.2	142.5	285.0	570.0	1140.0	2280.0	3420.0
		40.0	80.0	160.0	320.0	640.0	1280.0	2560.0	3840.0
		44.9	89.8	179.5	359.0	718.0	1436.0	2872.0	4308.0
		50.4	100.8	201.5	403.0	806.0	1612.0	3224.0	4836.0
		56.5	113.1	226.2	452.4	904.8	1809.6	3619.2	5428.8
		E	L	M	N	T			

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER) FOR 150MM FOCAL LENGTH LENSES

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER) FOR 180MM FOCAL LENGTH LENSES

		180MM		180MM		180MM		180MM		180MM		180MM	
		FOCAL LENGTH -		OBJECT DISTANCE -		MAGNIFICATION -		FOCAL LENGTH -		OBJECT DISTANCE -		MAGNIFICATION -	
		-6 GROUP LENGTH -		-6 GROUP LENGTH -		-6 GROUP LENGTH -		-6 GROUP LENGTH -		-6 GROUP LENGTH -		-6 GROUP LENGTH -	
		GROUP		GROUP		GROUP		GROUP		GROUP		GROUP	
E	-6	-5	-4	-3	-2	-1	1	-6	-5	-4	-3	-2	-1
L	1.3	2.0	5.2	10.5	20.9	41.8	1	2.0	3.9	7.9	15.7	31.5	63.0
E	1.5	2.9	5.9	11.7	23.4	47.0	2	2.2	4.4	8.8	17.6	35.4	70.7
M	1.6	3.3	6.6	13.2	26.4	52.7	3	2.5	5.0	9.9	19.8	39.7	79.4
E	1.8	3.7	7.4	14.6	29.6	59.2	4	2.8	5.6	11.1	22.3	44.5	89.1
M	2.1	4.2	8.3	16.6	33.2	66.4	5	3.1	6.3	12.5	25.0	50.0	100.0
T	2.3	4.7	9.3	18.6	37.3	74.5	6	3.5	7.0	14.0	28.1	56.1	112.3

		180MM		180MM		180MM		180MM		180MM		180MM	
		FOCAL LENGTH -		OBJECT DISTANCE -		MAGNIFICATION -		FOCAL LENGTH -		OBJECT DISTANCE -		MAGNIFICATION -	
		-6 GROUP LENGTH -		-6 GROUP LENGTH -		-6 GROUP LENGTH -		-6 GROUP LENGTH -		-6 GROUP LENGTH -		-6 GROUP LENGTH -	
		GROUP		GROUP		GROUP		GROUP		GROUP		GROUP	
E	-6	-5	-4	-3	-2	-1	1	-6	-5	-4	-3	-2	-1
L	4.0	7.9	15.9	31.6	63.2	126.5	1	5.3	10.6	21.1	42.2	84.4	168.8
E	4.4	8.9	17.7	35.5	71.0	142.0	2	5.9	11.8	23.7	47.4	94.8	189.5
M	5.0	10.0	19.9	39.8	79.7	159.4	3	6.6	13.3	26.6	53.2	106.4	212.7
E	5.6	11.2	22.4	44.7	89.4	178.9	4	7.5	14.9	29.8	59.7	119.4	238.8
M	6.3	12.6	25.1	50.2	100.4	200.8	5	8.4	16.8	33.5	67.0	134.0	268.0
T	7.0	14.1	28.2	56.3	112.7	225.4	6	9.4	18.8	37.6	75.2	150.4	300.8

		180MM		180MM		180MM		180MM		180MM		180MM	
		FOCAL LENGTH -		OBJECT DISTANCE -		MAGNIFICATION -		FOCAL LENGTH -		OBJECT DISTANCE -		MAGNIFICATION -	
		-6 GROUP LENGTH -		-6 GROUP LENGTH -		-6 GROUP LENGTH -		-6 GROUP LENGTH -		-6 GROUP LENGTH -		-6 GROUP LENGTH -	
		GROUP		GROUP		GROUP		GROUP		GROUP		GROUP	
E	-6	-5	-4	-3	-2	-1	1	-6	-5	-4	-3	-2	-1
L	10.6	21.1	42.3	84.5	169.1	338.2	1	13.2	26.4	52.9	105.7	211.4	422.8
E	11.9	23.7	47.4	94.8	189.6	379.6	2	14.8	29.7	59.3	118.7	237.3	474.6
M	13.3	26.6	53.3	106.5	213.0	426.1	3	16.6	33.3	66.6	133.2	266.4	532.7
E	14.9	29.9	59.8	119.6	239.1	478.2	4	18.7	37.4	74.7	149.5	299.0	598.0
M	16.8	33.6	67.1	134.2	268.4	536.8	5	21.0	42.0	83.9	167.8	335.6	671.2
T	18.8	37.7	75.3	150.6	301.3	602.5	6	23.5	47.1	94.2	188.4	376.7	753.4

		180MM		180MM		180MM		180MM		180MM		180MM	
		FOCAL LENGTH -		OBJECT DISTANCE -		MAGNIFICATION -		FOCAL LENGTH -		OBJECT DISTANCE -		MAGNIFICATION -	
		-6 GROUP LENGTH -		-6 GROUP LENGTH -		-6 GROUP LENGTH -		-6 GROUP LENGTH -		-6 GROUP LENGTH -		-6 GROUP LENGTH -	
		GROUP		GROUP		GROUP		GROUP		GROUP		GROUP	
E	-6	-5	-4	-3	-2	-1	1	-6	-5	-4	-3	-2	-1
L	26.4	52.9	105.8	211.5	423.1	846.2	1	39.7	79.3	158.7	317.4	634.7	1269.4
E	29.7	59.4	118.7	237.5	474.9	949.8	2	44.5	89.1	178.1	356.3	712.5	1425.0
M	33.3	66.6	133.1	266.5	533.1	1066.3	3	50.0	100.0	199.9	399.9	799.9	1599.9
E	37.4	74.8	149.6	299.2	598.3	1196.6	4	56.1	112.2	224.4	448.8	897.7	1795.4
M	42.0	84.0	167.9	335.8	671.6	1343.2	5	63.0	126.0	251.9	503.8	1007.6	2015.2
T	47.1	94.2	188.4	376.8	753.6	1507.2	6	70.7	141.4	282.7	565.5	1131.0	2262.0

IMAGE PLATE RESOLUTION (LINES PER MILLIMETER) FOR 200MM FOCAL LENGTH LENSES

	200MM				200MM				200MM			
	FOCAL LENGTH	OBJECT DISTANCE	MAGNIFICATION	-6 GROUP LENGTH	FOCAL LENGTH	OBJECT DISTANCE	MAGNIFICATION	-6 GROUP LENGTH	FOCAL LENGTH	OBJECT DISTANCE	MAGNIFICATION	-6 GROUP LENGTH
E 1	1.2	2.3	4.7	1.2	1.2	2.3	4.7	1.2	1.2	2.3	4.7	1.2
E 2	1.3	2.4	5.0	1.3	1.3	2.4	5.0	1.3	1.3	2.4	5.0	1.3
E 3	1.4	2.5	5.3	1.4	1.4	2.5	5.3	1.4	1.4	2.5	5.3	1.4
E 4	1.5	2.6	5.6	1.5	1.5	2.6	5.6	1.5	1.5	2.6	5.6	1.5
E 5	1.6	2.7	5.9	1.6	1.6	2.7	5.9	1.6	1.6	2.7	5.9	1.6
E 6	1.7	2.8	6.2	1.7	1.7	2.8	6.2	1.7	1.7	2.8	6.2	1.7
E 7	1.8	2.9	6.5	1.8	1.8	2.9	6.5	1.8	1.8	2.9	6.5	1.8
E 8	1.9	3.0	6.8	1.9	1.9	3.0	6.8	1.9	1.9	3.0	6.8	1.9
E 9	2.0	3.1	7.1	2.0	2.0	3.1	7.1	2.0	2.0	3.1	7.1	2.0
E 10	2.1	3.2	7.4	2.1	2.1	3.2	7.4	2.1	2.1	3.2	7.4	2.1
E 11	2.2	3.3	7.7	2.2	2.2	3.3	7.7	2.2	2.2	3.3	7.7	2.2
E 12	2.3	3.4	8.0	2.3	2.3	3.4	8.0	2.3	2.3	3.4	8.0	2.3
E 13	2.4	3.5	8.3	2.4	2.4	3.5	8.3	2.4	2.4	3.5	8.3	2.4
E 14	2.5	3.6	8.6	2.5	2.5	3.6	8.6	2.5	2.5	3.6	8.6	2.5
E 15	2.6	3.7	8.9	2.6	2.6	3.7	8.9	2.6	2.6	3.7	8.9	2.6
E 16	2.7	3.8	9.2	2.7	2.7	3.8	9.2	2.7	2.7	3.8	9.2	2.7
E 17	2.8	3.9	9.5	2.8	2.8	3.9	9.5	2.8	2.8	3.9	9.5	2.8
E 18	2.9	4.0	9.8	2.9	2.9	4.0	9.8	2.9	2.9	4.0	9.8	2.9
E 19	3.0	4.1	10.1	3.0	3.0	4.1	10.1	3.0	3.0	4.1	10.1	3.0
E 20	3.1	4.2	10.4	3.1	3.1	4.2	10.4	3.1	3.1	4.2	10.4	3.1
E 21	3.2	4.3	10.7	3.2	3.2	4.3	10.7	3.2	3.2	4.3	10.7	3.2
E 22	3.3	4.4	11.0	3.3	3.3	4.4	11.0	3.3	3.3	4.4	11.0	3.3
E 23	3.4	4.5	11.3	3.4	3.4	4.5	11.3	3.4	3.4	4.5	11.3	3.4
E 24	3.5	4.6	11.6	3.5	3.5	4.6	11.6	3.5	3.5	4.6	11.6	3.5
E 25	3.6	4.7	11.9	3.6	3.6	4.7	11.9	3.6	3.6	4.7	11.9	3.6
E 26	3.7	4.8	12.2	3.7	3.7	4.8	12.2	3.7	3.7	4.8	12.2	3.7
E 27	3.8	4.9	12.5	3.8	3.8	4.9	12.5	3.8	3.8	4.9	12.5	3.8
E 28	3.9	5.0	12.8	3.9	3.9	5.0	12.8	3.9	3.9	5.0	12.8	3.9
E 29	4.0	5.1	13.1	4.0	4.0	5.1	13.1	4.0	4.0	5.1	13.1	4.0
E 30	4.1	5.2	13.4	4.1	4.1	5.2	13.4	4.1	4.1	5.2	13.4	4.1
E 31	4.2	5.3	13.7	4.2	4.2	5.3	13.7	4.2	4.2	5.3	13.7	4.2
E 32	4.3	5.4	14.0	4.3	4.3	5.4	14.0	4.3	4.3	5.4	14.0	4.3
E 33	4.4	5.5	14.3	4.4	4.4	5.5	14.3	4.4	4.4	5.5	14.3	4.4
E 34	4.5	5.6	14.6	4.5	4.5	5.6	14.6	4.5	4.5	5.6	14.6	4.5
E 35	4.6	5.7	14.9	4.6	4.6	5.7	14.9	4.6	4.6	5.7	14.9	4.6
E 36	4.7	5.8	15.2	4.7	4.7	5.8	15.2	4.7	4.7	5.8	15.2	4.7
E 37	4.8	5.9	15.5	4.8	4.8	5.9	15.5	4.8	4.8	5.9	15.5	4.8
E 38	4.9	6.0	15.8	4.9	4.9	6.0	15.8	4.9	4.9	6.0	15.8	4.9
E 39	5.0	6.1	16.1	5.0	5.0	6.1	16.1	5.0	5.0	6.1	16.1	5.0
E 40	5.1	6.2	16.4	5.1	5.1	6.2	16.4	5.1	5.1	6.2	16.4	5.1
E 41	5.2	6.3	16.7	5.2	5.2	6.3	16.7	5.2	5.2	6.3	16.7	5.2
E 42	5.3	6.4	17.0	5.3	5.3	6.4	17.0	5.3	5.3	6.4	17.0	5.3
E 43	5.4	6.5	17.3	5.4	5.4	6.5	17.3	5.4	5.4	6.5	17.3	5.4
E 44	5.5	6.6	17.6	5.5	5.5	6.6	17.6	5.5	5.5	6.6	17.6	5.5
E 45	5.6	6.7	17.9	5.6	5.6	6.7	17.9	5.6	5.6	6.7	17.9	5.6
E 46	5.7	6.8	18.2	5.7	5.7	6.8	18.2	5.7	5.7	6.8	18.2	5.7
E 47	5.8	6.9	18.5	5.8	5.8	6.9	18.5	5.8	5.8	6.9	18.5	5.8
E 48	5.9	7.0	18.8	5.9	5.9	7.0	18.8	5.9	5.9	7.0	18.8	5.9
E 49	6.0	7.1	19.1	6.0	6.0	7.1	19.1	6.0	6.0	7.1	19.1	6.0
E 50	6.1	7.2	19.4	6.1	6.1	7.2	19.4	6.1	6.1	7.2	19.4	6.1
E 51	6.2	7.3	19.7	6.2	6.2	7.3	19.7	6.2	6.2	7.3	19.7	6.2
E 52	6.3	7.4	20.0	6.3	6.3	7.4	20.0	6.3	6.3	7.4	20.0	6.3
E 53	6.4	7.5	20.3	6.4	6.4	7.5	20.3	6.4	6.4	7.5	20.3	6.4
E 54	6.5	7.6	20.6	6.5	6.5	7.6	20.6	6.5	6.5	7.6	20.6	6.5
E 55	6.6	7.7	20.9	6.6	6.6	7.7	20.9	6.6	6.6	7.7	20.9	6.6
E 56	6.7	7.8	21.2	6.7	6.7	7.8	21.2	6.7	6.7	7.8	21.2	6.7
E 57	6.8	7.9	21.5	6.8	6.8	7.9	21.5	6.8	6.8	7.9	21.5	6.8
E 58	6.9	8.0	21.8	6.9	6.9	8.0	21.8	6.9	6.9	8.0	21.8	6.9
E 59	7.0	8.1	22.1	7.0	7.0	8.1	22.1	7.0	7.0	8.1	22.1	7.0
E 60	7.1	8.2	22.4	7.1	7.1	8.2	22.4	7.1	7.1	8.2	22.4	7.1
E 61	7.2	8.3	22.7	7.2	7.2	8.3	22.7	7.2	7.2	8.3	22.7	7.2
E 62	7.3	8.4	23.0	7.3	7.3	8.4	23.0	7.3	7.3	8.4	23.0	7.3
E 63	7.4	8.5	23.3	7.4	7.4	8.5	23.3	7.4	7.4	8.5	23.3	7.4
E 64	7.5	8.6	23.6	7.5	7.5	8.6	23.6	7.5	7.5	8.6	23.6	7.5
E 65	7.6	8.7	23.9	7.6	7.6	8.7	23.9	7.6	7.6	8.7	23.9	7.6
E 66	7.7	8.8	24.2	7.7	7.7	8.8	24.2	7.7	7.7	8.8	24.2	7.7
E 67	7.8	8.9	24.5	7.8	7.8	8.9	24.5	7.8	7.8	8.9	24.5	7.8
E 68	7.9	9.0	24.8	7.9	7.9	9.0	24.8	7.9	7.9	9.0	24.8	7.9
E 69	8.0	9.1	25.1	8.0	8.0	9.1	25.1	8.0	8.0	9.1	25.1	8.0
E 70	8.1	9.2	25.4	8.1	8.1	9.2	25.4	8.1	8.1	9.2	25.4	8.1
E 71	8.2	9.3	25.7	8.2	8.2	9.3	25.7	8.2	8.2	9.3	25.7	8.2
E 72	8.3	9.4	26.0	8.3	8.3	9.4	26.0	8.3	8.3	9.4	26.0	8.3
E 73	8.4	9.5	26.3	8.4	8.4	9.5	26.3	8.4	8.4	9.5	26.3	8.4
E 74	8.5	9.6	26.6	8.5	8.5	9.6	26.6	8.5	8.5	9.6	26.6	8.5
E 75	8.6	9.7	26.9	8.6	8.6	9.7	26.9	8.6	8.6	9.7	26.9	8.6
E 76	8.7	9.8	27.2	8.7	8.7	9.8	27.2	8.7	8.7	9.8	27.2	8.7
E 77	8.8	9.9	27.5	8.8	8.8	9.9	27.5	8.8	8.8	9.9	27.5	8.8
E 78	8.9	10.0	27.8	8.9	8.9	10.0	27.8	8.9	8.9	10.0	27.8	8.9
E 79	9.0	10.1	28.1	9.0	9.0	10.1	28.1	9.0	9.0	10.1	28.1	9.0
E 80	9.1	10.2	28.4	9.1	9.1	10.2	28.4	9.1	9.1	10.2	28.4	9.1
E 81	9.2	10.3	28.7	9.2	9.2	10.3	28.7	9.2	9.2	10.3	28.7	9.2
E 82	9.3	10.4	29.0	9.3	9.3	10.4	29.0	9.3	9.3	10.4	29.0	9.3
E 83	9.4	10.5	29.3	9.4	9.4	10.5	29.3	9.4	9.4	10.5	29.3	9.4
E 84	9.5	10.6	29.6	9.5	9.5	10.6	29.6	9.5	9.5	10.6	29.6	9.5
E 85	9.6	10.7	29.9	9.6	9.6	10.7	29.9	9.6	9.6	10.7	29.9	9.6
E 86	9.7	10.8	30.2	9.7	9.7	10.8	30.2	9.7	9.7	10.8	30.2	9.7
E 87	9.8	10.9	30.5	9.8	9.8	10.9	30.5	9.8	9.8	10.9	30.5	9.8
E 88	9.9	11.0	30.8	9.9	9.9	11.0	30.8	9.9	9.9	11.0	30.8	9.9
E 89	10.0	11.1	31.1	10.0	10.0	11.1	31.1	10.0	10.0	11.1	31.1	10.0
E 90	10.1	11.2	31.4	10.1	10.1	11.2	31.4	10.1	10.1	11.2	31.4	10.1
E 91	10.2	11.3	31.7	10.2	10.2	11.3	31.7	10.2	10.2	11.3	31.7	10.2
E 92	10.3	11.4	32.0	10.3	10.3	11.4	32.0	10.3	10.3	11.4	32.0	10.3
E 93	10.4	11.5	32.3	10.4	10.4	11.5	32.3	10.4	10.4	11.5	32.3	10.4
E 94	10.5	11.6	32.6	10.5	10.5	11.6	32.6	10.5	10.5	11.6	32.6	10.5
E 95	10.6	11.7	32.9	10.6	10.6	11.7	32.9	10.6	10.6	11.7	32.9	10.6
E 96	10.7	11.8	33.2	10.7	10.7	11.8	33.2	10.7	10.7	11.8	33.2	10.7
E 97	10.8	11.9	33.5	10.8	10.8	11.9	33.5	10.8	10.8	11.9	33.5	10.8
E 98	10.9	12.0	33.8	10.9	10.9	12.0	33.8	10.9	10.9	12.0	33.8	10.9
E 99	11.0	12.1	34.1	11.0	11.0	12.1	34.1	11.0	11.0	12.1	34.1	11.0
E 100	11.1	12.2	34.4	11.1	11.1	12.2	34.4	11.1	11.1	12.2	34.4	11.1

	200MM				200MM				200MM					
FOCAL LENGTH	-	200MM			FOCAL LENGTH	-	200MM			FOCAL LENGTH	-	200MM		
OBJECT DISTANCE	-	150.FT.(	45.72M)		OBJECT DISTANCE	-	200.FT.(	60.96M)		OBJECT DISTANCE	-	300.FT.(	91.44M)	
MAGNIFICATION	-	.004394			MAGNIFICATION	-	.003292			MAGNIFICATION	-	.002192		
-6 GROUP LENGTH	-	3.352MM(	.132 IN.)		-6 GROUP LENGTH	-	2.512MM(	.0989IN.)		-6 GROUP LENGTH	-	1.673MM(	.0658IN.)	

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER) FOR 205MM FOCAL LENGTH LENSES

FOCAL LENGTH - 205MM		FOCAL LENGTH - 205MM		FOCAL LENGTH - 205MM		FOCAL LENGTH - 205MM	
OBJECT DISTANCE -	75.FT. (22.86M)	OBJECT DISTANCE -	75.FT. (22.86M)	OBJECT DISTANCE -	75.FT. (22.86M)	OBJECT DISTANCE -	75.FT. (22.86M)
MAGNIFICATION -	.009049	MAGNIFICATION -	.009049	MAGNIFICATION -	.009049	MAGNIFICATION -	.009049
-6 GROUP LENGTH -	6.904MM (.2718IN.)	-6 GROUP LENGTH -	6.904MM (.2718IN.)	-6 GROUP LENGTH -	6.904MM (.2718IN.)	-6 GROUP LENGTH -	6.904MM (.2718IN.)
GROUP		GROUP		GROUP		GROUP	
E	-6	-5	-4	-3	-2	-1	
L 1	1.1	2.3	4.5	1.7	3.5	6.9	13.8
E 2	1.3	2.6	5.1	1.9	3.9	7.8	15.5
M 3	1.6	2.9	5.7	2.2	4.4	8.7	17.4
E 4	1.8	3.2	6.3	2.4	4.9	9.8	19.5
M 5	1.9	3.4	6.7	2.7	5.5	11.0	21.9
T 6	2.0	3.6	7.2	3.1	6.2	12.3	24.6
E	-6	-5	-4	-3	-2	-1	
L 1	1.1	2.3	4.5	1.7	3.5	6.9	13.8
E 2	1.3	2.6	5.1	1.9	3.9	7.8	15.5
M 3	1.6	2.9	5.7	2.2	4.4	8.7	17.4
E 4	1.8	3.2	6.3	2.4	4.9	9.8	19.5
M 5	1.9	3.4	6.7	2.7	5.5	11.0	21.9
T 6	2.0	3.6	7.2	3.1	6.2	12.3	24.6

FOCAL LENGTH - 205MM		FOCAL LENGTH - 205MM		FOCAL LENGTH - 205MM		FOCAL LENGTH - 205MM	
OBJECT DISTANCE -	100.FT. (30.48M)	OBJECT DISTANCE -	100.FT. (30.48M)	OBJECT DISTANCE -	100.FT. (30.48M)	OBJECT DISTANCE -	100.FT. (30.48M)
MAGNIFICATION -	.006771	MAGNIFICATION -	.006771	MAGNIFICATION -	.006771	MAGNIFICATION -	.006771
-6 GROUP LENGTH -	5.166MM (.2034IN.)	-6 GROUP LENGTH -	5.166MM (.2034IN.)	-6 GROUP LENGTH -	5.166MM (.2034IN.)	-6 GROUP LENGTH -	5.166MM (.2034IN.)
GROUP		GROUP		GROUP		GROUP	
E	-6	-5	-4	-3	-2	-1	
L 1	1.1	2.3	4.5	1.7	3.5	6.9	13.8
E 2	1.3	2.6	5.1	1.9	3.9	7.8	15.5
M 3	1.6	2.9	5.7	2.2	4.4	8.7	17.4
E 4	1.8	3.2	6.3	2.4	4.9	9.8	19.5
M 5	1.9	3.4	6.7	2.7	5.5	11.0	21.9
T 6	2.0	3.6	7.2	3.1	6.2	12.3	24.6
E	-6	-5	-4	-3	-2	-1	
L 1	1.1	2.3	4.5	1.7	3.5	6.9	13.8
E 2	1.3	2.6	5.1	1.9	3.9	7.8	15.5
M 3	1.6	2.9	5.7	2.2	4.4	8.7	17.4
E 4	1.8	3.2	6.3	2.4	4.9	9.8	19.5
M 5	1.9	3.4	6.7	2.7	5.5	11.0	21.9
T 6	2.0	3.6	7.2	3.1	6.2	12.3	24.6

FOCAL LENGTH - 205MM		FOCAL LENGTH - 205MM		FOCAL LENGTH - 205MM		FOCAL LENGTH - 205MM	
OBJECT DISTANCE -	150.FT. (45.72M)	OBJECT DISTANCE -	150.FT. (45.72M)	OBJECT DISTANCE -	150.FT. (45.72M)	OBJECT DISTANCE -	150.FT. (45.72M)
MAGNIFICATION -	.00449	MAGNIFICATION -	.00449	MAGNIFICATION -	.00449	MAGNIFICATION -	.00449
-6 GROUP LENGTH -	3.422MM (.1347IN.)	-6 GROUP LENGTH -	3.422MM (.1347IN.)	-6 GROUP LENGTH -	3.422MM (.1347IN.)	-6 GROUP LENGTH -	3.422MM (.1347IN.)
GROUP		GROUP		GROUP		GROUP	
E	-6	-5	-4	-3	-2	-1	
L 1	1.1	2.3	4.5	1.7	3.5	6.9	13.8
E 2	1.3	2.6	5.1	1.9	3.9	7.8	15.5
M 3	1.6	2.9	5.7	2.2	4.4	8.7	17.4
E 4	1.8	3.2	6.3	2.4	4.9	9.8	19.5
M 5	1.9	3.4	6.7	2.7	5.5	11.0	21.9
T 6	2.0	3.6	7.2	3.1	6.2	12.3	24.6
E	-6	-5	-4	-3	-2	-1	
L 1	1.1	2.3	4.5	1.7	3.5	6.9	13.8
E 2	1.3	2.6	5.1	1.9	3.9	7.8	15.5
M 3	1.6	2.9	5.7	2.2	4.4	8.7	17.4
E 4	1.8	3.2	6.3	2.4	4.9	9.8	19.5
M 5	1.9	3.4	6.7	2.7	5.5	11.0	21.9
T 6	2.0	3.6	7.2	3.1	6.2	12.3	24.6

FOCAL LENGTH - 205MM		FOCAL LENGTH - 205MM		FOCAL LENGTH - 205MM		FOCAL LENGTH - 205MM	
OBJECT DISTANCE -	200.FT. (60.96M)	OBJECT DISTANCE -	200.FT. (60.96M)	OBJECT DISTANCE -	200.FT. (60.96M)	OBJECT DISTANCE -	200.FT. (60.96M)
MAGNIFICATION -	.003374	MAGNIFICATION -	.003374	MAGNIFICATION -	.003374	MAGNIFICATION -	.003374
-6 GROUP LENGTH -	2.575MM (.1014IN.)	-6 GROUP LENGTH -	2.575MM (.1014IN.)	-6 GROUP LENGTH -	2.575MM (.1014IN.)	-6 GROUP LENGTH -	2.575MM (.1014IN.)
GROUP		GROUP		GROUP		GROUP	
E	-6	-5	-4	-3	-2	-1	
L 1	1.1	2.3	4.5	1.7	3.5	6.9	13.8
E 2	1.3	2.6	5.1	1.9	3.9	7.8	15.5
M 3	1.6	2.9	5.7	2.2	4.4	8.7	17.4
E 4	1.8	3.2	6.3	2.4	4.9	9.8	19.5
M 5	1.9	3.4	6.7	2.7	5.5	11.0	21.9
T 6	2.0	3.6	7.2	3.1	6.2	12.3	24.6
E	-6	-5	-4	-3	-2	-1	
L 1	1.1	2.3	4.5	1.7	3.5	6.9	13.8
E 2	1.3	2.6	5.1	1.9	3.9	7.8	15.5
M 3	1.6	2.9	5.7	2.2	4.4	8.7	17.4
E 4	1.8	3.2	6.3	2.4	4.9	9.8	19.5
M 5	1.9	3.4	6.7	2.7	5.5	11.0	21.9
T 6	2.0	3.6	7.2	3.1	6.2	12.3	24.6

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER) FOR 205MM FOCAL LENGTH LENSES

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER) FOR 210MM FOCAL LENGTH LENSES

210MM		210MM		210MM		210MM		210MM	
FOCAL LENGTH	OBJECT DISTANCE	FOCAL LENGTH	OBJECT DISTANCE	FOCAL LENGTH	OBJECT DISTANCE	FOCAL LENGTH	OBJECT DISTANCE	FOCAL LENGTH	OBJECT DISTANCE
50.0 FT. (15.24M)	0.013972	75.0 FT. (22.86M)	0.009272	100.0 FT. (30.48M)	0.006938	150.0 FT. (45.72M)	0.004614	200.0 FT. (60.96M)	0.003457
-6 GROUP LENGTH=10.661MM (.4197IN.)	-6 GROUP LENGTH=10.661MM (.4197IN.)	-6 GROUP LENGTH=7.074MM (.2785IN.)	-6 GROUP LENGTH=7.074MM (.2785IN.)	-6 GROUP LENGTH=5.293MM (.2084IN.)	-6 GROUP LENGTH=5.293MM (.2084IN.)	-6 GROUP LENGTH=3.521MM (.1384IN.)	-6 GROUP LENGTH=3.521MM (.1384IN.)	-6 GROUP LENGTH=2.638MM (.1038IN.)	-6 GROUP LENGTH=2.638MM (.1038IN.)
E	-6	E	-6	E	-6	E	-6	E	-6
L 1	1.1	L 1	1.7	L 1	2.3	L 1	3.0	L 1	4.0
E 2	1.3	E 2	1.9	E 2	2.5	E 2	3.0	E 2	4.0
M 3	1.4	M 3	2.1	M 3	2.8	M 3	3.0	M 3	4.0
E 4	1.6	E 4	2.4	E 4	3.2	E 4	3.0	E 4	4.0
N 5	1.8	N 5	2.7	N 5	3.6	N 5	3.0	N 5	4.0
T 6	2.0	T 6	3.0	T 6	4.0	T 6	3.0	T 6	4.0
210MM		210MM		210MM		210MM		210MM	
FOCAL LENGTH	OBJECT DISTANCE	FOCAL LENGTH	OBJECT DISTANCE	FOCAL LENGTH	OBJECT DISTANCE	FOCAL LENGTH	OBJECT DISTANCE	FOCAL LENGTH	OBJECT DISTANCE
50.0 FT. (15.24M)	0.013972	75.0 FT. (22.86M)	0.009272	100.0 FT. (30.48M)	0.006938	150.0 FT. (45.72M)	0.004614	200.0 FT. (60.96M)	0.003457
-6 GROUP LENGTH=10.661MM (.4197IN.)	-6 GROUP LENGTH=10.661MM (.4197IN.)	-6 GROUP LENGTH=7.074MM (.2785IN.)	-6 GROUP LENGTH=7.074MM (.2785IN.)	-6 GROUP LENGTH=5.293MM (.2084IN.)	-6 GROUP LENGTH=5.293MM (.2084IN.)	-6 GROUP LENGTH=3.521MM (.1384IN.)	-6 GROUP LENGTH=3.521MM (.1384IN.)	-6 GROUP LENGTH=2.638MM (.1038IN.)	-6 GROUP LENGTH=2.638MM (.1038IN.)
E	-6	E	-6	E	-6	E	-6	E	-6
L 1	1.1	L 1	1.7	L 1	2.3	L 1	3.0	L 1	4.0
E 2	1.3	E 2	1.9	E 2	2.5	E 2	3.0	E 2	4.0
M 3	1.4	M 3	2.1	M 3	2.8	M 3	3.0	M 3	4.0
E 4	1.6	E 4	2.4	E 4	3.2	E 4	3.0	E 4	4.0
N 5	1.8	N 5	2.7	N 5	3.6	N 5	3.0	N 5	4.0
T 6	2.0	T 6	3.0	T 6	4.0	T 6	3.0	T 6	4.0

210MM		210MM		210MM		210MM		210MM	
FOCAL LENGTH	OBJECT DISTANCE	FOCAL LENGTH	OBJECT DISTANCE	FOCAL LENGTH	OBJECT DISTANCE	FOCAL LENGTH	OBJECT DISTANCE	FOCAL LENGTH	OBJECT DISTANCE
50.0 FT. (15.24M)	0.013972	75.0 FT. (22.86M)	0.009272	100.0 FT. (30.48M)	0.006938	150.0 FT. (45.72M)	0.004614	200.0 FT. (60.96M)	0.003457
-6 GROUP LENGTH=10.661MM (.4197IN.)	-6 GROUP LENGTH=10.661MM (.4197IN.)	-6 GROUP LENGTH=7.074MM (.2785IN.)	-6 GROUP LENGTH=7.074MM (.2785IN.)	-6 GROUP LENGTH=5.293MM (.2084IN.)	-6 GROUP LENGTH=5.293MM (.2084IN.)	-6 GROUP LENGTH=3.521MM (.1384IN.)	-6 GROUP LENGTH=3.521MM (.1384IN.)	-6 GROUP LENGTH=2.638MM (.1038IN.)	-6 GROUP LENGTH=2.638MM (.1038IN.)
E	-6	E	-6	E	-6	E	-6	E	-6
L 1	1.1	L 1	1.7	L 1	2.3	L 1	3.0	L 1	4.0
E 2	1.3	E 2	1.9	E 2	2.5	E 2	3.0	E 2	4.0
M 3	1.4	M 3	2.1	M 3	2.8	M 3	3.0	M 3	4.0
E 4	1.6	E 4	2.4	E 4	3.2	E 4	3.0	E 4	4.0
N 5	1.8	N 5	2.7	N 5	3.6	N 5	3.0	N 5	4.0
T 6	2.0	T 6	3.0	T 6	4.0	T 6	3.0	T 6	4.0
210MM		210MM		210MM		210MM		210MM	
FOCAL LENGTH	OBJECT DISTANCE	FOCAL LENGTH	OBJECT DISTANCE	FOCAL LENGTH	OBJECT DISTANCE	FOCAL LENGTH	OBJECT DISTANCE	FOCAL LENGTH	OBJECT DISTANCE
50.0 FT. (15.24M)	0.013972	75.0 FT. (22.86M)	0.009272	100.0 FT. (30.48M)	0.006938	150.0 FT. (45.72M)	0.004614	200.0 FT. (60.96M)	0.003457
-6 GROUP LENGTH=10.661MM (.4197IN.)	-6 GROUP LENGTH=10.661MM (.4197IN.)	-6 GROUP LENGTH=7.074MM (.2785IN.)	-6 GROUP LENGTH=7.074MM (.2785IN.)	-6 GROUP LENGTH=5.293MM (.2084IN.)	-6 GROUP LENGTH=5.293MM (.2084IN.)	-6 GROUP LENGTH=3.521MM (.1384IN.)	-6 GROUP LENGTH=3.521MM (.1384IN.)	-6 GROUP LENGTH=2.638MM (.1038IN.)	-6 GROUP LENGTH=2.638MM (.1038IN.)
E	-6	E	-6	E	-6	E	-6	E	-6
L 1	1.1	L 1	1.7	L 1	2.3	L 1	3.0	L 1	4.0
E 2	1.3	E 2	1.9	E 2	2.5	E 2	3.0	E 2	4.0
M 3	1.4	M 3	2.1	M 3	2.8	M 3	3.0	M 3	4.0
E 4	1.6	E 4	2.4	E 4	3.2	E 4	3.0	E 4	4.0
N 5	1.8	N 5	2.7	N 5	3.6	N 5	3.0	N 5	4.0
T 6	2.0	T 6	3.0	T 6	4.0	T 6	3.0	T 6	4.0

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER) FOR 210MM FOCAL LENGTH LENSES

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER) FOR 250MM FOCAL LENGTH LENSES

250MM				250MM				250MM			
GROUP	FOCAL LENGTH	OBJECT DISTANCE	MAGNIFICATION	GROUP	FOCAL LENGTH	OBJECT DISTANCE	MAGNIFICATION	GROUP	FOCAL LENGTH	OBJECT DISTANCE	MAGNIFICATION
E 1	-6	-3	-2	E 1	-6	-3	-2	E 1	-6	-3	-2
L 1	-9	3.7	7.5	L 1	-6	-3	-2	L 1	-6	-3	-2
E 2	-5	1.4	15.0	E 2	-5	1.4	15.0	E 2	-5	1.4	15.0
L 2	-1	2.1	9.4	L 2	-1	2.1	9.4	L 2	-1	2.1	9.4
E 3	-2	4.7	4.4	E 3	-2	4.7	4.4	E 3	-2	4.7	4.4
L 3	-1	2.4	14.9	L 3	-1	2.4	14.9	L 3	-1	2.4	14.9
E 4	-3	5.3	13.6	E 4	-3	5.3	13.6	E 4	-3	5.3	13.6
L 4	-1	2.0	21.2	L 4	-1	2.0	21.2	L 4	-1	2.0	21.2
E 5	-3	5.7	11.9	E 5	-3	5.7	11.9	E 5	-3	5.7	11.9
L 5	-1	2.3	13.4	L 5	-1	2.3	13.4	L 5	-1	2.3	13.4
E 6	-4	6.7	11.4	E 6	-4	6.7	11.4	E 6	-4	6.7	11.4

GROUP	FOCAL LENGTH -	OBJECT DISTANCE -	MAGNIFICATION -	FOCAL LENGTH -	OBJECT DISTANCE -	MAGNIFICATION -	FOCAL LENGTH -	OBJECT DISTANCE -	MAGNIFICATION -
1	2.0	11.0	22.7	45.4	40.9	1	5.7	11.4	22.0
2	3.2	12.4	24.4	51.3	42.1	2	6.4	12.0	25.6
3	3.6	13.1	25.3	51.3	42.1	3	7.2	14.4	28.7
4	4.0	14.0	26.3	51.3	42.1	4	8.1	16.1	32.2
5	4.4	15.0	27.2	51.3	42.1	5	9.0	18.1	36.2
6	4.8	16.0	28.1	51.3	42.1	6	10.2	20.3	40.6
7	5.2	17.0	29.0	51.3	42.1	7	11.4	22.6	45.4
8	5.6	18.0	29.9	51.3	42.1	8	12.6	25.0	50.2
9	6.0	19.0	30.8	51.3	42.1	9	13.8	27.4	55.0
10	6.4	20.0	31.7	51.3	42.1	10	15.0	30.0	60.0
11	6.8	21.0	32.6	51.3	42.1	11	16.2	32.6	65.0
12	7.2	22.0	33.5	51.3	42.1	12	17.4	35.2	70.0
13	7.6	23.0	34.4	51.3	42.1	13	18.6	37.8	75.0
14	8.0	24.0	35.3	51.3	42.1	14	19.8	40.4	80.0
15	8.4	25.0	36.2	51.3	42.1	15	21.0	43.0	85.0
16	8.8	26.0	37.1	51.3	42.1	16	22.2	45.6	90.0
17	9.2	27.0	38.0	51.3	42.1	17	23.4	48.2	95.0
18	9.6	28.0	38.9	51.3	42.1	18	24.6	50.8	100.0
19	10.0	29.0	39.8	51.3	42.1	19	25.8	53.4	105.0
20	10.4	30.0	40.7	51.3	42.1	20	27.0	56.0	110.0
21	10.8	31.0	41.6	51.3	42.1	21	28.2	58.6	115.0
22	11.2	32.0	42.5	51.3	42.1	22	29.4	61.2	120.0
23	11.6	33.0	43.4	51.3	42.1	23	30.6	63.8	125.0
24	12.0	34.0	44.3	51.3	42.1	24	31.8	66.4	130.0
25	12.4	35.0	45.2	51.3	42.1	25	33.0	69.0	135.0
26	12.8	36.0	46.1	51.3	42.1	26	34.2	71.6	140.0
27	13.2	37.0	47.0	51.3	42.1	27	35.4	74.2	145.0
28	13.6	38.0	47.9	51.3	42.1	28	36.6	76.8	150.0
29	14.0	39.0	48.8	51.3	42.1	29	37.8	79.4	155.0
30	14.4	40.0	49.7	51.3	42.1	30	39.0	82.0	160.0
31	14.8	41.0	50.6	51.3	42.1	31	40.2	84.6	165.0
32	15.2	42.0	51.5	51.3	42.1	32	41.4	87.2	170.0
33	15.6	43.0	52.4	51.3	42.1	33	42.6	89.8	175.0
34	16.0	44.0	53.3	51.3	42.1	34	43.8	92.4	180.0
35	16.4	45.0	54.2	51.3	42.1	35	45.0	95.0	185.0
36	16.8	46.0	55.1	51.3	42.1	36	46.2	97.6	190.0
37	17.2	47.0	56.0	51.3	42.1	37	47.4	100.2	195.0
38	17.6	48.0	56.9	51.3	42.1	38	48.6	102.8	200.0
39	18.0	49.0	57.8	51.3	42.1	39	49.8	105.4	205.0
40	18.4	50.0	58.7	51.3	42.1	40	51.0	108.0	210.0
41	18.8	51.0	59.6	51.3	42.1	41	52.2	110.6	215.0
42	19.2	52.0	60.5	51.3	42.1	42	53.4	113.2	220.0
43	19.6	53.0	61.4	51.3	42.1	43	54.6	115.8	225.0
44	20.0	54.0	62.3	51.3	42.1	44	55.8	118.4	230.0
45	20.4	55.0	63.2	51.3	42.1	45	57.0	121.0	235.0
46	20.8	56.0	64.1	51.3	42.1	46	58.2	123.6	240.0
47	21.2	57.0	65.0	51.3	42.1	47	59.4	126.2	245.0
48	21.6	58.0	65.9	51.3	42.1	48	60.6	128.8	250.0
49	22.0	59.0	66.8	51.3	42.1	49	61.8	131.4	255.0
50	22.4	60.0	67.7	51.3	42.1	50	63.0	134.0	260.0
51	22.8	61.0	68.6	51.3	42.1	51	64.2	136.6	265.0
52	23.2	62.0	69.5	51.3	42.1	52	65.4	139.2	270.0
53	23.6	63.0	70.4	51.3	42.1	53	66.6	141.8	275.0
54	24.0	64.0	71.3	51.3	42.1	54	67.8	144.4	280.0
55	24.4	65.0	72.2	51.3	42.1	55	69.0	147.0	285.0
56	24.8	66.0	73.1	51.3	42.1	56	70.2	149.6	290.0
57	25.2	67.0	74.0	51.3	42.1	57	71.4	152.2	295.0
58	25.6	68.0	74.9	51.3	42.1	58	72.6	154.8	300.0
59	26.0	69.0	75.8	51.3	42.1	59	73.8	157.4	305.0
60	26.4	70.0	76.7	51.3	42.1	60	75.0	160.0	310.0
61	26.8	71.0	77.6	51.3	42.1	61	76.2	162.6	315.0
62	27.2	72.0	78.5	51.3	42.1	62	77.4	165.2	320.0
63	27.6	73.0	79.4	51.3	42.1	63	78.6	167.8	325.0
64	28.0	74.0	80.3	51.3	42.1	64	79.8	170.4	330.0
65	28.4	75.0	81.2	51.3	42.1	65	81.0	173.0	335.0
66	28.8	76.0	82.1	51.3	42.1	66	82.2	175.6	340.0
67	29.2	77.0	83.0	51.3	42.1	67	83.4	178.2	345.0
68	29.6	78.0	83.9	51.3	42.1	68	84.6	180.8	350.0
69	30.0	79.0	84.8	51.3	42.1	69	85.8	183.4	355.0
70	30.4	80.0	85.7	51.3	42.1	70	87.0	186.0	360.0
71	30.8	81.0	86.6	51.3	42.1	71	88.2	188.6	365.0
72	31.2	82.0	87.5	51.3	42.1	72	89.4	191.2	370.0
73	31.6	83.0	88.4	51.3	42.1	73	90.6	193.8	375.0
74	32.0	84.0	89.3	51.3	42.1	74	91.8	196.4	380.0
75	32.4	85.0	90.2	51.3	42.1	75	93.0	199.0	385.0
76	32.8	86.0	91.1	51.3	42.1	76	94.2	201.6	390.0
77	33.2	87.0	92.0	51.3	42.1	77	95.4	204.2	395.0
78	33.6	88.0	92.9	51.3	42.1	78	96.6	206.8	400.0
79	34.0	89.0	93.8	51.3	42.1	79	97.8	209.4	405.0
80	34.4	90.0	94.7	51.3	42.1	80	99.0	212.0	410.0
81	34.8	91.0	95.6	51.3	42.1	81	100.2	214.6	415.0
82	35.2	92.0	96.5	51.3	42.1	82	101.4	217.2	420.0
83	35.6	93.0	97.4	51.3	42.1	83	102.6	219.8	425.0
84	36.0	94.0	98.3	51.3	42.1	84	103.8	222.4	430.0
85	36.4	95.0	99.2	51.3	42.1	85	105.0	225.0	435.0
86	36.8	96.0	100.1	51.3	42.1	86	106.2	227.6	440.0
87	37.2	97.0	101.0	51.3	42.1	87	107.4	230.2	445.0
88	37.6	98.0	101.9	51.3	42.1	88	108.6	232.8	450.0
89	38.0	99.0	102.8	51.3	42.1	89	109.8	235.4	455.0
90	38.4	100.0	103.7	51.3	42.1	90	111.0	238.0	460.0
91	38.8	101.0	104.6	51.3	42.1	91	112.2	240.6	465.0
92	39.2	102.0	105.5	51.3	42.1	92	113.4	243.2	470.0
93	39.6	103.0	106.4	51.3	42.1	93	114.6	245.8	475.0
94	40.0	104.0	107.3	51.3	42.1	94	115.8	248.4	480.0
95	40.4	105.0	108.2	51.3	42.1	95	117.0	251.0	485.0
96	40.8	106.0	109.1	51.3	42.1	96	118.2	253.6	490.0
97	41.2	107.0	110.0	51.3	42.1	97	119.4	256.2	495.0
98	41.6	108.0	110.9	51.3	42.1	98	120.6	258.8	500.0
99	42.0	109.0	111.8	51.3	42.1	99	121.8	261.4	505.0
100	42.4	110.0	112.7	51.3	42.1	100	123.0	264.0	510.0

[illegible]

240MM				250MM			
FOCAL LENGTH	OBJECT DISTANCE	MAGNIFICATION	GROUP	FOCAL LENGTH	OBJECT DISTANCE	MAGNIFICATION	GROUP
19.0	14.1	76.1	-1	28.6	57.1	114.2	-1
21.4	17.7	85.4	-1	32.1	64.1	128.2	-1
24.0	19.8	91.9	-1	34.8	72.0	143.9	-1
26.9	21.6	107.7	-1	40.4	80.8	161.6	-1
30.2	24.4	120.9	-1	45.3	90.7	181.3	-1
33.7	27.9	135.7	-1	50.9	101.6	203.5	-1
36.1	30.1	145.3	-1	55.9	114.2	226.5	-1
38.0	31.9	153.9	-1	60.5	120.9	241.6	-1
40.0	33.9	161.6	-1	67.9	135.7	271.4	-1
42.7	35.5	171.0	-1	76.1	161.6	340.7	-1
45.7	37.7	183.7	-1	85.4	183.7	427.7	-1
48.0	39.6	191.9	-1	96.0	203.5	480.0	-1
50.9	41.6	203.5	-1	107.7	226.5	539.9	-1
53.9	43.8	215.4	-1	120.9	241.6	599.9	-1
57.1	46.1	226.5	-1	135.7	271.4	679.9	-1
60.5	48.6	241.6	-1	153.9	301.6	761.7	-1
64.1	51.2	256.5	-1	171.0	332.7	854.0	-1
67.9	54.0	271.4	-1	183.7	364.1	919.9	-1
70.0	56.2	286.2	-1	191.9	396.0	999.9	-1
72.0	58.8	301.6	-1	203.5	427.7	1099.9	-1
74.0	61.6	317.3	-1	226.5	480.0	1223.1	-1
76.1	64.1	332.7	-1	241.6	539.9	1363.6	-1
78.1	66.7	348.8	-1	256.5	599.9	1520.0	-1
80.1	69.4	364.1	-1	271.4	679.9	1693.3	-1
82.1	72.0	379.6	-1	286.2	761.7	1883.3	-1
84.1	74.7	396.0	-1	301.6	854.0	2099.9	-1
86.1	77.4	412.7	-1	317.3	919.9	2344.4	-1
88.1	80.1	429.4	-1	332.7	999.9	2617.7	-1
90.1	82.7	446.1	-1	348.8	1099.9	2920.0	-1
92.1	85.4	463.6	-1	364.1	1223.1	3263.3	-1
94.1	88.0	481.1	-1	380.0	1363.6	3648.0	-1
96.1	90.7	498.9	-1	396.0	1520.0	4075.0	-1
98.1	93.4	516.7	-1	412.7	1693.3	4546.7	-1
100.1	96.0	534.8	-1	429.4	1883.3	5063.3	-1
102.1	98.6	552.9	-1	446.1	2099.9	5626.7	-1
104.1	101.2	571.0	-1	463.6	2344.4	6240.0	-1
106.1	103.8	589.0	-1	481.1	2617.7	6903.3	-1
108.1	106.4	607.0	-1	498.9	2920.0	7617.7	-1
110.1	109.0	625.0	-1	516.7	3263.3	8383.3	-1
112.1	111.6	643.0	-1	534.8	3648.0	9200.0	-1
114.1	114.2	661.1	-1	552.9	4075.0	10073.3	-1
116.1	116.8	679.2	-1	571.0	4546.7	11000.0	-1
118.1	119.4	697.3	-1	589.0	5063.3	12083.3	-1
120.1	122.0	715.4	-1	607.0	5626.7	13320.0	-1
122.1	124.6	733.5	-1	625.0	6240.0	14613.3	-1
124.1	127.2	751.6	-1	643.0	6903.3	16066.7	-1
126.1	129.8	769.7	-1	661.1	7617.7	17680.0	-1
128.1	132.4	787.8	-1	679.2	8383.3	19440.0	-1
130.1	135.0	805.9	-1	697.3	9200.0	21353.3	-1
132.1	137.6	824.0	-1	715.4	10073.3	23420.0	-1
134.1	140.2	842.1	-1	733.5	11000.0	25650.0	-1
136.1	142.8	860.2	-1	751.6	12083.3	28053.3	-1
138.1	145.4	878.3	-1	769.7	13320.0	30640.0	-1
140.1	148.0	896.4	-1	787.8	14613.3	33413.3	-1
142.1	150.6	914.5	-1	805.9	16066.7	36373.3	-1
144.1	153.2	932.6	-1	824.0	17680.0	39520.0	-1
146.1	155.8	950.7	-1	842.1	19440.0	42863.3	-1
148.1	158.4	968.8	-1	860.2	21353.3	46403.3	-1
150.1	161.0	986.9	-1	878.3	23420.0	50140.0	-1
152.1	163.6	1005.0	-1	896.4	25650.0	54083.3	-1
154.1	166.2	1023.1	-1	914.5	28053.3	58233.3	-1
156.1	168.8	1041.2	-1	932.6	30640.0	62593.3	-1
158.1	171.4	1059.3	-1	950.7	33413.3	67160.0	-1
160.1	174.0	1077.4	-1	968.8	36373.3	71943.3	-1
162.1	176.6	1095.5	-1	986.9	39520.0	76953.3	-1
164.1	179.2	1113.6	-1	1005.0	42863.3	82193.3	-1
166.1	181.8	1131.7	-1	1023.1	46403.3	87663.3	-1
168.1	184.4	1149.8	-1	1041.2	50140.0	93360.0	-1
170.1	187.0	1167.9	-1	1059.3	54083.3	99283.3	-1
172.1	189.6	1186.0	-1	1077.4	58233.3	105433.3	-1
174.1	192.2	1204.1	-1	1095.5	62593.3	111813.3	-1
176.1	194.8	1222.2	-1	1113.6	67160.0	118420.0	-1
178.1	197.4	1240.3	-1	1131.7	71943.3	125263.3	-1
180.1	200.0	1258.4	-1	1149.8	76953.3	132343.3	-1
182.1	202.6	1276.5	-1	1167.9	82193.3	139660.0	-1
184.1	205.2	1294.6	-1	1186.0	87663.3	147213.3	-1
186.1	207.8	1312.7	-1	1204.1	93360.0	155000.0	-1
188.1	210.4	1330.8	-1	1222.2	99283.3	163023.3	-1
190.1	213.0	1348.9	-1	1240.3	105433.3	171280.0	-1
192.1	215.6	1367.0	-1	1258.4	111813.3	179773.3	-1
194.1	218.2	1385.1	-1	1276.5	118420.0	188500.0	-1
196.1	220.8	1403.2	-1	1294.6	125263.3	197463.3	-1
198.1	223.4	1421.3	-1	1312.7	132343.3	206663.3	-1
200.1	226.0	1439.4	-1	1330.8	139660.0	216100.0	-1
202.1	228.6	1457.5	-1	1348.9	147213.3	225773.3	-1
204.1	231.2	1475.6	-1	1367.0	155000.0	235683.3	-1
206.1	233.8	1493.7	-1	1385.1	163023.3	245920.0	-1
208.1	236.4	1511.8	-1	1403.2	171280.0	256393.3	-1
210.1	239.0	1529.9	-1	1421.3	180000.0	267100.0	-1
212.1	241.6	1548.0	-1	1439.4	189063.3	278043.3	-1
214.1	244.2	1566.1	-1	1457.5	198463.3	289220.0	-1
216.1	246.8	1584.2	-1	1475.6	208200.0	300633.3	-1
218.1	249.4	1602.3	-1	1493.7	218283.3	312280.0	-1
220.1	252.0	1620.4	-1	1511.8	228613.3	324163.3	-1
222.1	254.6	1638.5	-1	1529.9	239200.0	336283.3	-1
224.1	257.2	1656.6	-1	1548.0	249943.3	348640.0	-1
226.1	259.8	1674.7	-1	1566.1	260843.3	361233.3	-1
228.1	262.4	1692.8	-1	1584.2	271900.0	374063.3	-1
230.1	265.0	1710.9	-1	1602.3	283113.3	387133.3	-1
232.1	267.6	1729.0	-1	1620.4	294483.3	400443.3	-1
234.1	270.2	1747.1	-1	1638.5	306013.3	414000.0	-1
236.1	272.8	1765.2	-1	1656.6	317700.0	427803.3	-1
238.1	275.4	1783.3	-1	1674.7	329543.3	441843.3	-1
240.1	278.0	1801.4	-1	1692.8	341543.3	456120.0	-1
242.1	280.6	1819.5	-1	1710.9	353700.0	470633.3	-1
244.1	283.2	1837.6	-1	1729.0	366013.3	485383.3	-1
246.1	285.8	1855.7	-1	1747.1	378483.3	500373.3	-1
248.1	288.4	1873.8	-1	1765.2	391113.3	515600.0	-1
250.1	291.0	1891.9	-1	1783.3	403900.0	531063.3	-1
252.1	293.6	1910.0	-1	1801.4	416843.3	546763.3	-1
254.1	296.2	1928.1	-1	1819.5	429943.3	562700.0	-1
256.1	298.8	1946.2	-1	1837.6	443100.0	578873.3	-1
258.1	301.4	1964.3	-1	1855.7	456413.3	595283.3	-1
260.1	304.0	1982.4	-1	1873.8	469883.3	611933.3	-1
262.1	306.6	2000.5	-1	1891.9	483513.3	628820.0	-1
264.1	309.2	2018.6	-1	1910.0	497300.0	645943.3	-1
266.1	311.8	2036.7	-1	1928.1	511243.3	663300.0	-1
268.1	314.4	2054.8	-1	1946.2	525343.3	680893.3	-1
270.1	317.0	2072.9	-1	1964.3	539500.0	698720.0	-1
272.1	319.6	2091.0	-1	1982.4	553813.3	716783.3	-1
274.1	322.2	2109.1	-1	2000.5	568283.3	735083.3	-1
276.1	324.8	2127.2	-1	2018.6	582913.3	753620.0	-1
278.1	327.4	2145.3	-1	2036.7	597600.0	772393.3	-1
280.1	330.0	2163.4	-1	2054.8	612443.3	791400.0	-1
282.1	332.6	2181.5	-1	2072.9	627443.3	810643.3	-1
284.1	335.2	2199.6	-1	2091.0	642500.0	830120.0	-1
286.1	337.8	2217.7	-1	2109.1	657713.3	849833.3	-1
288.1	340.4	2235.8	-1	2127.2	673083.3	869783.3	-1
290.1	343.0	2253.9	-1	2145.3	688613.3	890000.0	-1
292.1	345.6	2272.0	-1	2163.4	704300.0	910463.3	-1
294.1	348.2	2290.1	-1	2181.5	720143.3	931173.3	-1
296.1	350.8	2308.2	-1	2199.6	736143.3	952120.0	-1
298.1	353.4	2326.3	-1	2217.7	752300.0	973313.3	-1
300.1	356.0	2344.4	-1	2235.8	768613.3	994743.3	-1
302.1	358.6	2362.5	-1	2253.9	785083.3	1016400.0	-1
304.1	361.2	2380.6	-1	2272.0	801713.3	1038283.3	-1
306.1	363.8	2398.7	-1	2290.1	818500.0	1060400.0	-1
308.1	366.4	2416.8	-1	2308.2	835443.3	1082743.3	-1
310.1	369.0	2434.9	-1	2326.3	852543.3	1105320.0	-1
312.1	371.6	2453.0	-1	2344.4	869800.0	1128133.3	-1
314.1	374.2	2471.1	-1	2362.5	887213.3	1151183.3	-1
316.1	376.8	2489.2	-1	2380.6	904783.3	1174466.7	-1
318.1	379.4	2507.3	-1	2398.7	922513.3	1197983.3	-1
320.1	382.0	2525.4	-1	2416.8	940400.0	1221733.3	-1
322.1	384.6	2543.5	-1	2434.9	958443.3	1245720.0	-1
324.1	387.2	2561.6	-1	2453.0	976643.3	1270943.3	-1
326.1	389.8	2579.7	-1	2471.1	995000.0	1296400.0	-1
328.1	392.4	2597.8	-1	2489.2	1013513.3	1322093.3	-1
330.1	395.0	2615.9	-1	2507.3	1032183.3	1348020.0	-1
332.1	397.6	2634.0	-1	2525.4	1051013.3	1374183.3	-1
334.1	400.2	2652.1	-1	2543.5	1070000.0	1400583.3	-1
336.1	402.8	2670.2	-1	2561.6	1089143.3	1427320.0	-

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER) FOR 350MM FOCAL LENGTH LENSES

FOCAL LENGTH - 350MM		FOCAL LENGTH - 350MM		FOCAL LENGTH - 350MM		FOCAL LENGTH - 350MM	
OBJECT DISTANCE -	MAGNIFICATION -	OBJECT DISTANCE -	MAGNIFICATION -	OBJECT DISTANCE -	MAGNIFICATION -	OBJECT DISTANCE -	MAGNIFICATION -
100.0 FT. (30.48M)	.011616	150.0 FT. (45.72M)	.007714	200.0 FT. (60.96M)	.005775	250.0 FT. (76.20M)	.004620
-6 GROUP LENGTH -	8.443MM (.2604IN.)	-6 GROUP LENGTH -	5.886MM (.2317IN.)	-6 GROUP LENGTH -	4.406MM (.1735IN.)	-6 GROUP LENGTH -	3.305MM (.1301IN.)
GROUP		GROUP		GROUP		GROUP	
-5	-2	-5	-2	-5	-2	-5	-2
1.3	2.7	2.0	4.1	2.0	4.1	2.7	5.4
1.5	3.0	2.3	4.5	2.3	4.5	3.0	6.1
1.7	3.4	2.6	5.1	2.6	5.1	3.4	6.8
1.9	3.8	2.9	5.7	2.9	5.7	3.8	7.7
2.1	4.3	3.2	6.4	3.2	6.4	4.3	8.6
2.4	4.8	3.6	7.2	3.6	7.2	4.8	9.6
E 1	L 1	E 1	L 1	E 1	L 1	E 1	L 1
E 2	E 2	E 2	E 2	E 2	E 2	E 2	E 2
M 3	M 3	M 3	M 3	M 3	M 3	M 3	M 3
E 4	E 4	E 4	E 4	E 4	E 4	E 4	E 4
M 5	M 5	M 5	M 5	M 5	M 5	M 5	M 5
T 6	T 6	T 6	T 6	T 6	T 6	T 6	T 6

FOCAL LENGTH - 350MM		FOCAL LENGTH - 350MM		FOCAL LENGTH - 350MM		FOCAL LENGTH - 350MM	
OBJECT DISTANCE -	MAGNIFICATION -	OBJECT DISTANCE -	MAGNIFICATION -	OBJECT DISTANCE -	MAGNIFICATION -	OBJECT DISTANCE -	MAGNIFICATION -
100.0 FT. (30.48M)	.003422	150.0 FT. (45.72M)	.002979	200.0 FT. (60.96M)	.002302	250.0 FT. (76.20M)	.001926
-6 GROUP LENGTH -	2.932MM (.1154IN.)	-6 GROUP LENGTH -	2.197MM (.0865IN.)	-6 GROUP LENGTH -	1.756MM (.0691IN.)	-6 GROUP LENGTH -	1.354MM (.0533IN.)
GROUP		GROUP		GROUP		GROUP	
-5	-2	-5	-2	-5	-2	-5	-2
4.1	8.1	4.1	8.1	4.1	8.1	4.1	8.1
4.6	9.1	4.6	9.1	4.6	9.1	4.6	9.1
5.1	10.2	5.1	10.2	5.1	10.2	5.1	10.2
5.4	11.5	5.4	11.5	5.4	11.5	5.4	11.5
6.5	12.9	6.5	12.9	6.5	12.9	6.5	12.9
7.2	14.5	7.2	14.5	7.2	14.5	7.2	14.5
E 1	L 1	E 1	L 1	E 1	L 1	E 1	L 1
E 2	E 2	E 2	E 2	E 2	E 2	E 2	E 2
M 3	M 3	M 3	M 3	M 3	M 3	M 3	M 3
E 4	E 4	E 4	E 4	E 4	E 4	E 4	E 4
M 5	M 5	M 5	M 5	M 5	M 5	M 5	M 5
T 6	T 6	T 6	T 6	T 6	T 6	T 6	T 6

FOCAL LENGTH - 350MM		FOCAL LENGTH - 350MM		FOCAL LENGTH - 350MM		FOCAL LENGTH - 350MM	
OBJECT DISTANCE -	MAGNIFICATION -	OBJECT DISTANCE -	MAGNIFICATION -	OBJECT DISTANCE -	MAGNIFICATION -	OBJECT DISTANCE -	MAGNIFICATION -
100.0 FT. (30.48M)	.001533	150.0 FT. (45.72M)	.001150	200.0 FT. (60.96M)	.000766	250.0 FT. (76.20M)	.000585
-6 GROUP LENGTH -	1.170MM (.0461IN.)	-6 GROUP LENGTH -	.877MM (.0345IN.)	-6 GROUP LENGTH -	.665MM (.0262IN.)	-6 GROUP LENGTH -	.508MM (.0200IN.)
GROUP		GROUP		GROUP		GROUP	
-5	-2	-5	-2	-5	-2	-5	-2
10.2	20.4	10.2	20.4	10.2	20.4	10.2	20.4
11.4	22.8	11.4	22.8	11.4	22.8	11.4	22.8
12.8	25.6	12.8	25.6	12.8	25.6	12.8	25.6
14.4	28.8	14.4	28.8	14.4	28.8	14.4	28.8
16.2	32.4	16.2	32.4	16.2	32.4	16.2	32.4
18.2	36.3	18.2	36.3	18.2	36.3	18.2	36.3
E 1	L 1	E 1	L 1	E 1	L 1	E 1	L 1
E 2	E 2	E 2	E 2	E 2	E 2	E 2	E 2
M 3	M 3	M 3	M 3	M 3	M 3	M 3	M 3
E 4	E 4	E 4	E 4	E 4	E 4	E 4	E 4
M 5	M 5	M 5	M 5	M 5	M 5	M 5	M 5
T 6	T 6	T 6	T 6	T 6	T 6	T 6	T 6

FOCAL LENGTH - 350MM		FOCAL LENGTH - 350MM		FOCAL LENGTH - 350MM		FOCAL LENGTH - 350MM	
OBJECT DISTANCE -	MAGNIFICATION -	OBJECT DISTANCE -	MAGNIFICATION -	OBJECT DISTANCE -	MAGNIFICATION -	OBJECT DISTANCE -	MAGNIFICATION -
100.0 FT. (30.48M)	.000574	150.0 FT. (45.72M)	.000383	200.0 FT. (60.96M)	.000287	250.0 FT. (76.20M)	.000230
-6 GROUP LENGTH -	.638MM (.0251IN.)	-6 GROUP LENGTH -	.492MM (.0194IN.)	-6 GROUP LENGTH -	.371MM (.0146IN.)	-6 GROUP LENGTH -	.281MM (.0111IN.)
GROUP		GROUP		GROUP		GROUP	
-5	-2	-5	-2	-5	-2	-5	-2
27.2	54.4	27.2	54.4	27.2	54.4	27.2	54.4
30.5	61.0	30.5	61.0	30.5	61.0	30.5	61.0
34.3	68.6	34.3	68.6	34.3	68.6	34.3	68.6
38.5	77.0	38.5	77.0	38.5	77.0	38.5	77.0
43.2	86.4	43.2	86.4	43.2	86.4	43.2	86.4
48.5	97.0	48.5	97.0	48.5	97.0	48.5	97.0
E 1	L 1	E 1	L 1	E 1	L 1	E 1	L 1
E 2	E 2	E 2	E 2	E 2	E 2	E 2	E 2
M 3	M 3	M 3	M 3	M 3	M 3	M 3	M 3
E 4	E 4	E 4	E 4	E 4	E 4	E 4	E 4
M 5	M 5	M 5	M 5	M 5	M 5	M 5	M 5
T 6	T 6	T 6	T 6	T 6	T 6	T 6	T 6

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER) FOR 350MM FOCAL LENGTH LENSES

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER) FOR 400MM FOCAL LENGTH LENSES

		FOCAL LENGTH - 400MM		FOCAL LENGTH - 400MM		FOCAL LENGTH - 400MM	
		OBJECT DISTANCE -	MAGNIFICATION -	OBJECT DISTANCE -	MAGNIFICATION -	OBJECT DISTANCE -	MAGNIFICATION -
		-6 GROUP LENGTH -	-6 GROUP LENGTH -	-6 GROUP LENGTH -	-6 GROUP LENGTH -	-6 GROUP LENGTH -	-6 GROUP LENGTH -
		GROUP	GROUP	GROUP	GROUP	GROUP	GROUP

E 1	-4	1.2	2.3	4.1	1.8	3.5	7.1	14.2	28.3	56.7	-3	-2	-1
E 2	-4	1.3	2.6	5.3	2.0	4.0	7.9	15.9	31.8	63.6	-4	-3	-2
E 3	-4	1.5	3.0	5.9	2.2	4.5	8.9	17.8	35.7	71.4	-5	-4	-3
E 4	-4	1.7	3.3	6.6	2.5	5.0	10.0	20.0	40.1	80.1	-6	-5	-4
E 5	-4	1.9	3.7	7.5	2.8	5.6	11.2	22.5	45.0	89.9	-7	-6	-5
T 4	-4	2.1	4.2	8.4	3.2	6.3	12.6	25.2	50.5	100.9	-8	-7	-6

		FOCAL LENGTH - 400MM		FOCAL LENGTH - 400MM		FOCAL LENGTH - 400MM	
		OBJECT DISTANCE -	MAGNIFICATION -	OBJECT DISTANCE -	MAGNIFICATION -	OBJECT DISTANCE -	MAGNIFICATION -
		-6 GROUP LENGTH -	-6 GROUP LENGTH -	-6 GROUP LENGTH -	-6 GROUP LENGTH -	-6 GROUP LENGTH -	-6 GROUP LENGTH -
		GROUP	GROUP	GROUP	GROUP	GROUP	GROUP

E 1	-4	3.6	7.1	14.2	4.7	9.5	19.0	38.0	75.9	151.9	-3	-2	-1
E 2	-4	4.0	8.0	16.0	5.3	10.7	21.3	42.6	85.3	170.5	-4	-3	-2
E 3	-4	4.5	9.0	18.0	6.0	12.0	24.0	48.0	96.0	192.0	-5	-4	-3
E 4	-4	5.0	10.0	20.0	6.7	13.4	26.9	53.7	107.4	214.8	-6	-5	-4
E 5	-4	5.5	11.0	22.0	7.5	15.0	30.1	60.3	120.6	241.1	-7	-6	-5
T 6	-4	6.3	12.7	25.3	8.5	16.9	33.8	67.7	135.3	270.7	-8	-7	-6

		FOCAL LENGTH - 400MM		FOCAL LENGTH - 400MM		FOCAL LENGTH - 400MM	
		OBJECT DISTANCE -	MAGNIFICATION -	OBJECT DISTANCE -	MAGNIFICATION -	OBJECT DISTANCE -	MAGNIFICATION -
		-6 GROUP LENGTH -	-6 GROUP LENGTH -	-6 GROUP LENGTH -	-6 GROUP LENGTH -	-6 GROUP LENGTH -	-6 GROUP LENGTH -
		GROUP	GROUP	GROUP	GROUP	GROUP	GROUP

E 1	-4	8.4	17.0	35.7	11.0	23.0	47.6	95.1	190.2	380.5	-3	-2	-1
E 2	-4	10.3	21.0	42.0	13.3	26.7	53.4	106.8	213.6	427.1	-4	-3	-2
E 3	-4	11.2	22.5	45.0	15.0	30.0	59.9	119.9	239.7	479.4	-5	-4	-3
E 4	-4	12.0	24.0	48.0	16.8	33.6	67.3	134.5	269.1	538.1	-6	-5	-4
E 5	-4	13.2	26.3	52.6	18.4	37.8	75.5	151.0	302.0	604.0	-7	-6	-5
T 6	-4	15.4	30.8	61.6	21.2	42.4	84.7	169.5	339.0	678.0	-8	-7	-6

		FOCAL LENGTH - 400MM		FOCAL LENGTH - 400MM		FOCAL LENGTH - 400MM	
		OBJECT DISTANCE -	MAGNIFICATION -	OBJECT DISTANCE -	MAGNIFICATION -	OBJECT DISTANCE -	MAGNIFICATION -
		-6 GROUP LENGTH -	-6 GROUP LENGTH -	-6 GROUP LENGTH -	-6 GROUP LENGTH -	-6 GROUP LENGTH -	-6 GROUP LENGTH -
		GROUP	GROUP	GROUP	GROUP	GROUP	GROUP

E 1	-4	23.4	47.0	94.0	31.0	62.0	124.0	248.0	496.0	992.0	-3	-2	-1
E 2	-4	26.7	53.4	106.8	35.0	70.0	140.0	280.0	560.0	1120.0	-4	-3	-2
E 3	-4	30.0	60.0	120.0	40.0	80.0	160.0	320.0	640.0	1280.0	-5	-4	-3
E 4	-4	33.3	66.6	133.3	45.0	90.0	180.0	360.0	720.0	1440.0	-6	-5	-4
E 5	-4	37.0	74.0	148.0	50.0	100.0	200.0	400.0	800.0	1600.0	-7	-6	-5
T 6	-4	42.0	84.0	168.0	56.0	112.0	224.0	448.0	896.0	1792.0	-8	-7	-6

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER) FOR 600MM FOCAL LENGTH LENSES

FOCAL LENGTH - 600MM		FOCAL LENGTH - 600MM		FOCAL LENGTH - 600MM		FOCAL LENGTH - 600MM	
OBJECT DISTANCE -	100.FT. (30.48M)	OBJECT DISTANCE -	150.FT. (45.72M)	OBJECT DISTANCE -	200.FT. (60.96M)	OBJECT DISTANCE -	200.FT. (60.96M)
MAGNIFICATION -	.02080	MAGNIFICATION -	.013298	MAGNIFICATION -	.00946	MAGNIFICATION -	.00946
-6 GROUP LENGTH -	15.32MM (.032IN.)	-6 GROUP LENGTH -	10.146MM (.3995IN.)	-6 GROUP LENGTH -	7.564MM (.2986IN.)	-6 GROUP LENGTH -	7.564MM (.2986IN.)
GROUP		GROUP		GROUP		GROUP	
E	-5	-5	-5	-6	-5	-6	-5
L	1	1	1	1	1	1	1
E	2	2	2	2	2	2	2
M	3	3	3	3	3	3	3
E	4	4	4	4	4	4	4
N	5	5	5	5	5	5	5
T	6	6	6	6	6	6	6

FOCAL LENGTH - 600MM		FOCAL LENGTH - 600MM		FOCAL LENGTH - 600MM		FOCAL LENGTH - 600MM	
OBJECT DISTANCE -	300.FT. (91.44M)	OBJECT DISTANCE -	400.FT. (121.92M)	OBJECT DISTANCE -	500.FT. (152.40M)	OBJECT DISTANCE -	500.FT. (152.40M)
MAGNIFICATION -	.006605	MAGNIFICATION -	.004946	MAGNIFICATION -	.003953	MAGNIFICATION -	.003953
-6 GROUP LENGTH -	5.140MM (.1984IN.)	-6 GROUP LENGTH -	3.773MM (.1486IN.)	-6 GROUP LENGTH -	3.016MM (.1187IN.)	-6 GROUP LENGTH -	3.016MM (.1187IN.)
GROUP		GROUP		GROUP		GROUP	
E	-5	-5	-5	-6	-5	-6	-5
L	1	1	1	1	1	1	1
E	2	2	2	2	2	2	2
M	3	3	3	3	3	3	3
E	4	4	4	4	4	4	4
N	5	5	5	5	5	5	5
T	6	6	6	6	6	6	6

FOCAL LENGTH - 600MM		FOCAL LENGTH - 600MM		FOCAL LENGTH - 600MM		FOCAL LENGTH - 600MM	
OBJECT DISTANCE -	750.FT. (228.60M)	OBJECT DISTANCE -	1000.FT. (304.80M)	OBJECT DISTANCE -	1500.FT. (457.20M)	OBJECT DISTANCE -	1500.FT. (457.20M)
MAGNIFICATION -	.002052	MAGNIFICATION -	.001972	MAGNIFICATION -	.001314	MAGNIFICATION -	.001314
-6 GROUP LENGTH -	2.008MM (.0791IN.)	-6 GROUP LENGTH -	1.505MM (.0592IN.)	-6 GROUP LENGTH -	1.003MM (.0395IN.)	-6 GROUP LENGTH -	1.003MM (.0395IN.)
GROUP		GROUP		GROUP		GROUP	
E	-5	-5	-5	-6	-5	-6	-5
L	1	1	1	1	1	1	1
E	2	2	2	2	2	2	2
M	3	3	3	3	3	3	3
E	4	4	4	4	4	4	4
N	5	5	5	5	5	5	5
T	6	6	6	6	6	6	6

FOCAL LENGTH - 600MM		FOCAL LENGTH - 600MM		FOCAL LENGTH - 600MM		FOCAL LENGTH - 600MM	
OBJECT DISTANCE -	2000.FT. (609.60M)	OBJECT DISTANCE -	3000.FT. (914.40M)	OBJECT DISTANCE -	4000.FT. (1219.20M)	OBJECT DISTANCE -	4000.FT. (1219.20M)
MAGNIFICATION -	.000495	MAGNIFICATION -	.000657	MAGNIFICATION -	.000492	MAGNIFICATION -	.000492
-6 GROUP LENGTH -	.742MM (.0292IN.)	-6 GROUP LENGTH -	.501MM (.0197IN.)	-6 GROUP LENGTH -	.376MM (.0148IN.)	-6 GROUP LENGTH -	.376MM (.0148IN.)
GROUP		GROUP		GROUP		GROUP	
E	-5	-5	-5	-6	-5	-6	-5
L	1	1	1	1	1	1	1
E	2	2	2	2	2	2	2
M	3	3	3	3	3	3	3
E	4	4	4	4	4	4	4
N	5	5	5	5	5	5	5
T	6	6	6	6	6	6	6

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER) FOR 710MM FOCAL LENGTH LENSES

FOCAL LENGTH - 710MM		FOCAL LENGTH - 710MM		FOCAL LENGTH - 710MM		FOCAL LENGTH - 710MM	
OBJECT DISTANCE -	200.FT. (60.96M)	OBJECT DISTANCE -	200.FT. (60.96M)	OBJECT DISTANCE -	200.FT. (60.96M)	OBJECT DISTANCE -	200.FT. (60.96M)
MAGNIFICATION -	.011784	MAGNIFICATION -	.011784	MAGNIFICATION -	.011784	MAGNIFICATION -	.011784
-6 GROUP LENGTH -	8.991MM (.3540IN.)	-6 GROUP LENGTH -	8.991MM (.3540IN.)	-6 GROUP LENGTH -	8.991MM (.3540IN.)	-6 GROUP LENGTH -	8.991MM (.3540IN.)
GROUP	GROUP	GROUP	GROUP	GROUP	GROUP	GROUP	GROUP
E	-6	-5	-4	-3	-2	-1	
L 1	1.0	2.0	4.0	7.9	15.4	31.7	63.4
E 2	1.1	2.2	4.4	8.9	17.8	35.6	71.2
M 3	1.2	2.5	5.0	10.0	20.0	40.0	80.0
E 4	1.4	2.8	5.6	11.2	22.4	44.8	89.6
N 5	1.6	3.1	6.1	12.4	24.8	49.6	99.2
T 6	1.8	3.5	7.1	14.1	28.2	56.4	112.8

FOCAL LENGTH - 710MM		FOCAL LENGTH - 710MM		FOCAL LENGTH - 710MM		FOCAL LENGTH - 710MM	
OBJECT DISTANCE -	500.FT. (152.40M)	OBJECT DISTANCE -	500.FT. (152.40M)	OBJECT DISTANCE -	500.FT. (152.40M)	OBJECT DISTANCE -	500.FT. (152.40M)
MAGNIFICATION -	.004681	MAGNIFICATION -	.004681	MAGNIFICATION -	.004681	MAGNIFICATION -	.004681
-6 GROUP LENGTH -	3.571MM (.1406IN.)	-6 GROUP LENGTH -	3.571MM (.1406IN.)	-6 GROUP LENGTH -	3.571MM (.1406IN.)	-6 GROUP LENGTH -	3.571MM (.1406IN.)
GROUP	GROUP	GROUP	GROUP	GROUP	GROUP	GROUP	GROUP
E	-6	-5	-4	-3	-2	-1	
L 1	2.7	5.3	10.7	21.3	42.7	85.4	170.8
E 2	3.0	6.0	12.0	24.0	48.0	96.0	192.0
M 3	3.4	6.7	13.4	26.8	53.6	107.2	214.4
E 4	3.8	7.5	15.0	30.0	60.0	120.0	240.0
N 5	4.2	8.4	16.8	33.6	67.2	134.4	268.8
T 6	4.6	9.2	18.4	36.8	73.6	147.2	294.4

FOCAL LENGTH - 710MM		FOCAL LENGTH - 710MM		FOCAL LENGTH - 710MM		FOCAL LENGTH - 710MM	
OBJECT DISTANCE -	1000.FT. (304.80M)	OBJECT DISTANCE -	1000.FT. (304.80M)	OBJECT DISTANCE -	1000.FT. (304.80M)	OBJECT DISTANCE -	1000.FT. (304.80M)
MAGNIFICATION -	.002335	MAGNIFICATION -	.002335	MAGNIFICATION -	.002335	MAGNIFICATION -	.002335
-6 GROUP LENGTH -	1.786MM (.0703IN.)	-6 GROUP LENGTH -	1.786MM (.0703IN.)	-6 GROUP LENGTH -	1.786MM (.0703IN.)	-6 GROUP LENGTH -	1.786MM (.0703IN.)
GROUP	GROUP	GROUP	GROUP	GROUP	GROUP	GROUP	GROUP
E	-6	-5	-4	-3	-2	-1	
L 1	6.7	13.4	26.8	53.6	107.2	214.4	428.8
E 2	7.5	15.0	30.0	60.0	120.0	240.0	480.0
M 3	8.4	16.8	33.6	67.2	134.4	268.8	537.6
E 4	9.5	19.0	38.0	76.0	152.0	304.0	608.0
N 5	10.6	21.2	42.4	84.8	169.6	339.2	678.4
T 6	11.9	23.8	47.6	95.2	190.4	380.8	761.6

FOCAL LENGTH - 710MM		FOCAL LENGTH - 710MM		FOCAL LENGTH - 710MM		FOCAL LENGTH - 710MM	
OBJECT DISTANCE -	3000.FT. (914.40M)	OBJECT DISTANCE -	3000.FT. (914.40M)	OBJECT DISTANCE -	3000.FT. (914.40M)	OBJECT DISTANCE -	3000.FT. (914.40M)
MAGNIFICATION -	.000777	MAGNIFICATION -	.000777	MAGNIFICATION -	.000777	MAGNIFICATION -	.000777
-6 GROUP LENGTH -	.593MM (.0233IN.)	-6 GROUP LENGTH -	.593MM (.0233IN.)	-6 GROUP LENGTH -	.593MM (.0233IN.)	-6 GROUP LENGTH -	.593MM (.0233IN.)
GROUP	GROUP	GROUP	GROUP	GROUP	GROUP	GROUP	GROUP
E	-6	-5	-4	-3	-2	-1	
L 1	20.1	40.2	80.4	160.7	321.5	643.0	1286.0
E 2	22.6	45.1	90.2	180.4	360.9	721.8	1443.6
M 3	25.3	50.6	101.3	202.5	405.0	810.0	1620.0
E 4	28.4	56.8	113.7	227.3	454.6	909.2	1818.4
N 5	31.9	63.8	127.6	255.2	510.3	1020.6	2041.2
T 6	35.6	71.2	142.4	284.8	569.6	1139.2	2278.4

IMAGE PLATE RESOLUTION (LINES PER MILLIMETER) FOR 914MM FOCAL LENGTH LENSES

FOCAL LENGTH - 914MM		FOCAL LENGTH - 914MM		FOCAL LENGTH - 914MM		FOCAL LENGTH - 914MM	
OBJECT DISTANCE - 100.0 FT. (30.48M)	MAGNIFICATION - .020309	OBJECT DISTANCE - 200.0 FT. (60.96M)	MAGNIFICATION - .015222	OBJECT DISTANCE - 300.0 FT. (91.44M)	MAGNIFICATION - .010957	OBJECT DISTANCE - 400.0 FT. (121.92M)	MAGNIFICATION - .007553
-6 GROUP LENGTH- 15.54MM (.412IN.)	-6 GROUP LENGTH- 11.61MM (.4572IN.)	-6 GROUP LENGTH- 11.61MM (.4572IN.)	-6 GROUP LENGTH- 11.61MM (.4572IN.)	-6 GROUP LENGTH- 11.61MM (.4572IN.)	-6 GROUP LENGTH- 11.61MM (.4572IN.)	-6 GROUP LENGTH- 11.61MM (.4572IN.)	-6 GROUP LENGTH- 11.61MM (.4572IN.)
E 1	-6	-6	-6	-6	-6	-6	-6
E 2	-5	-5	-5	-5	-5	-5	-5
E 3	-4	-4	-4	-4	-4	-4	-4
E 4	-3	-3	-3	-3	-3	-3	-3
E 5	-2	-2	-2	-2	-2	-2	-2
E 6	-1	-1	-1	-1	-1	-1	-1
L 1	1.5	1.5	1.5	1.5	1.5	1.5	1.5
L 2	1.7	1.7	1.7	1.7	1.7	1.7	1.7
M 3	1.9	1.9	1.9	1.9	1.9	1.9	1.9
E 4	2.2	2.2	2.2	2.2	2.2	2.2	2.2
E 5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
E 6	2.6	2.6	2.6	2.6	2.6	2.6	2.6

FOCAL LENGTH - 914MM		FOCAL LENGTH - 914MM		FOCAL LENGTH - 914MM		FOCAL LENGTH - 914MM	
OBJECT DISTANCE - 100.0 FT. (30.48M)	MAGNIFICATION - .007553	OBJECT DISTANCE - 200.0 FT. (60.96M)	MAGNIFICATION - .005034	OBJECT DISTANCE - 300.0 FT. (91.44M)	MAGNIFICATION - .003524	OBJECT DISTANCE - 400.0 FT. (121.92M)	MAGNIFICATION - .002534
-6 GROUP LENGTH- 15.54MM (.412IN.)	-6 GROUP LENGTH- 11.61MM (.4572IN.)	-6 GROUP LENGTH- 11.61MM (.4572IN.)	-6 GROUP LENGTH- 11.61MM (.4572IN.)	-6 GROUP LENGTH- 11.61MM (.4572IN.)	-6 GROUP LENGTH- 11.61MM (.4572IN.)	-6 GROUP LENGTH- 11.61MM (.4572IN.)	-6 GROUP LENGTH- 11.61MM (.4572IN.)
E 1	-6	-6	-6	-6	-6	-6	-6
E 2	-5	-5	-5	-5	-5	-5	-5
E 3	-4	-4	-4	-4	-4	-4	-4
E 4	-3	-3	-3	-3	-3	-3	-3
E 5	-2	-2	-2	-2	-2	-2	-2
E 6	-1	-1	-1	-1	-1	-1	-1
L 1	1.5	1.5	1.5	1.5	1.5	1.5	1.5
L 2	1.7	1.7	1.7	1.7	1.7	1.7	1.7
M 3	1.9	1.9	1.9	1.9	1.9	1.9	1.9
E 4	2.2	2.2	2.2	2.2	2.2	2.2	2.2
E 5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
E 6	2.6	2.6	2.6	2.6	2.6	2.6	2.6

FOCAL LENGTH - 914MM		FOCAL LENGTH - 914MM		FOCAL LENGTH - 914MM		FOCAL LENGTH - 914MM	
OBJECT DISTANCE - 100.0 FT. (30.48M)	MAGNIFICATION - .003524	OBJECT DISTANCE - 200.0 FT. (60.96M)	MAGNIFICATION - .002349	OBJECT DISTANCE - 300.0 FT. (91.44M)	MAGNIFICATION - .001762	OBJECT DISTANCE - 400.0 FT. (121.92M)	MAGNIFICATION - .001321
-6 GROUP LENGTH- 15.54MM (.412IN.)	-6 GROUP LENGTH- 11.61MM (.4572IN.)	-6 GROUP LENGTH- 11.61MM (.4572IN.)	-6 GROUP LENGTH- 11.61MM (.4572IN.)	-6 GROUP LENGTH- 11.61MM (.4572IN.)	-6 GROUP LENGTH- 11.61MM (.4572IN.)	-6 GROUP LENGTH- 11.61MM (.4572IN.)	-6 GROUP LENGTH- 11.61MM (.4572IN.)
E 1	-6	-6	-6	-6	-6	-6	-6
E 2	-5	-5	-5	-5	-5	-5	-5
E 3	-4	-4	-4	-4	-4	-4	-4
E 4	-3	-3	-3	-3	-3	-3	-3
E 5	-2	-2	-2	-2	-2	-2	-2
E 6	-1	-1	-1	-1	-1	-1	-1
L 1	1.5	1.5	1.5	1.5	1.5	1.5	1.5
L 2	1.7	1.7	1.7	1.7	1.7	1.7	1.7
M 3	1.9	1.9	1.9	1.9	1.9	1.9	1.9
E 4	2.2	2.2	2.2	2.2	2.2	2.2	2.2
E 5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
E 6	2.6	2.6	2.6	2.6	2.6	2.6	2.6

FOCAL LENGTH - 914MM		FOCAL LENGTH - 914MM		FOCAL LENGTH - 914MM		FOCAL LENGTH - 914MM	
OBJECT DISTANCE - 100.0 FT. (30.48M)	MAGNIFICATION - .001321	OBJECT DISTANCE - 200.0 FT. (60.96M)	MAGNIFICATION - .000881	OBJECT DISTANCE - 300.0 FT. (91.44M)	MAGNIFICATION - .000661	OBJECT DISTANCE - 400.0 FT. (121.92M)	MAGNIFICATION - .000500
-6 GROUP LENGTH- 15.54MM (.412IN.)	-6 GROUP LENGTH- 11.61MM (.4572IN.)	-6 GROUP LENGTH- 11.61MM (.4572IN.)	-6 GROUP LENGTH- 11.61MM (.4572IN.)	-6 GROUP LENGTH- 11.61MM (.4572IN.)	-6 GROUP LENGTH- 11.61MM (.4572IN.)	-6 GROUP LENGTH- 11.61MM (.4572IN.)	-6 GROUP LENGTH- 11.61MM (.4572IN.)
E 1	-6	-6	-6	-6	-6	-6	-6
E 2	-5	-5	-5	-5	-5	-5	-5
E 3	-4	-4	-4	-4	-4	-4	-4
E 4	-3	-3	-3	-3	-3	-3	-3
E 5	-2	-2	-2	-2	-2	-2	-2
E 6	-1	-1	-1	-1	-1	-1	-1
L 1	1.5	1.5	1.5	1.5	1.5	1.5	1.5
L 2	1.7	1.7	1.7	1.7	1.7	1.7	1.7
M 3	1.9	1.9	1.9	1.9	1.9	1.9	1.9
E 4	2.2	2.2	2.2	2.2	2.2	2.2	2.2
E 5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
E 6	2.6	2.6	2.6	2.6	2.6	2.6	2.6

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER) FOR 1000MM FOCAL LENGTH LENSES

FOCAL LENGTH - 1000MM		FOCAL LENGTH - 1000MM		FOCAL LENGTH - 1000MM		FOCAL LENGTH - 1000MM	
OBJECT DISTANCE -	100.0 FT. (30.48M)	OBJECT DISTANCE -	200.0 FT. (60.96M)	OBJECT DISTANCE -	300.0 FT. (91.44M)	OBJECT DISTANCE -	400.0 FT. (121.92M)
MAGNIFICATION -	.002261	MAGNIFICATION -	.016678	MAGNIFICATION -	.011957	MAGNIFICATION -	.0094394
-6 GROUP LENGTH -	17.462MM (.6871IN.)	-6 GROUP LENGTH -	12.725MM (.5010IN.)	-6 GROUP LENGTH -	8.437MM (.3321IN.)	-6 GROUP LENGTH -	6.352MM (.2500IN.)
GROUP		GROUP		GROUP		GROUP	
E	-5	E	-5	E	-5	E	-5
L	1	L	1	L	1	L	1
M	2	M	2	M	2	M	2
N	3	N	3	N	3	N	3
T	4	T	4	T	4	T	4

FOCAL LENGTH - 1000MM		FOCAL LENGTH - 1000MM		FOCAL LENGTH - 1000MM		FOCAL LENGTH - 1000MM	
OBJECT DISTANCE -	100.0 FT. (30.48M)	OBJECT DISTANCE -	200.0 FT. (60.96M)	OBJECT DISTANCE -	300.0 FT. (91.44M)	OBJECT DISTANCE -	400.0 FT. (121.92M)
MAGNIFICATION -	.002261	MAGNIFICATION -	.016678	MAGNIFICATION -	.011957	MAGNIFICATION -	.0094394
-6 GROUP LENGTH -	17.462MM (.6871IN.)	-6 GROUP LENGTH -	12.725MM (.5010IN.)	-6 GROUP LENGTH -	8.437MM (.3321IN.)	-6 GROUP LENGTH -	6.352MM (.2500IN.)
GROUP		GROUP		GROUP		GROUP	
E	-5	E	-5	E	-5	E	-5
L	1	L	1	L	1	L	1
M	2	M	2	M	2	M	2
N	3	N	3	N	3	N	3
T	4	T	4	T	4	T	4

FOCAL LENGTH - 1000MM		FOCAL LENGTH - 1000MM		FOCAL LENGTH - 1000MM		FOCAL LENGTH - 1000MM	
OBJECT DISTANCE -	100.0 FT. (30.48M)	OBJECT DISTANCE -	200.0 FT. (60.96M)	OBJECT DISTANCE -	300.0 FT. (91.44M)	OBJECT DISTANCE -	400.0 FT. (121.92M)
MAGNIFICATION -	.002261	MAGNIFICATION -	.016678	MAGNIFICATION -	.011957	MAGNIFICATION -	.0094394
-6 GROUP LENGTH -	17.462MM (.6871IN.)	-6 GROUP LENGTH -	12.725MM (.5010IN.)	-6 GROUP LENGTH -	8.437MM (.3321IN.)	-6 GROUP LENGTH -	6.352MM (.2500IN.)
GROUP		GROUP		GROUP		GROUP	
E	-5	E	-5	E	-5	E	-5
L	1	L	1	L	1	L	1
M	2	M	2	M	2	M	2
N	3	N	3	N	3	N	3
T	4	T	4	T	4	T	4

FOCAL LENGTH - 1000MM		FOCAL LENGTH - 1000MM		FOCAL LENGTH - 1000MM		FOCAL LENGTH - 1000MM	
OBJECT DISTANCE -	100.0 FT. (30.48M)	OBJECT DISTANCE -	200.0 FT. (60.96M)	OBJECT DISTANCE -	300.0 FT. (91.44M)	OBJECT DISTANCE -	400.0 FT. (121.92M)
MAGNIFICATION -	.002261	MAGNIFICATION -	.016678	MAGNIFICATION -	.011957	MAGNIFICATION -	.0094394
-6 GROUP LENGTH -	17.462MM (.6871IN.)	-6 GROUP LENGTH -	12.725MM (.5010IN.)	-6 GROUP LENGTH -	8.437MM (.3321IN.)	-6 GROUP LENGTH -	6.352MM (.2500IN.)
GROUP		GROUP		GROUP		GROUP	
E	-5	E	-5	E	-5	E	-5
L	1	L	1	L	1	L	1
M	2	M	2	M	2	M	2
N	3	N	3	N	3	N	3
T	4	T	4	T	4	T	4

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER) FOR 1000MM FOCAL LENGTH LENSES

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER) FOR 1060MM FOCAL LENGTH LENSES

FOCAL LENGTH - 1060MM													FOCAL LENGTH - 1060MM																
OBJECT DISTANCE - 150.FT. (45.72M)						OBJECT DISTANCE - 200.FT. (60.96M)						OBJECT DISTANCE - 300.FT. (91.44M)						OBJECT DISTANCE - 500.FT. (152.40M)											
MAGNIFICATION - .023735						MAGNIFICATION - .017696						MAGNIFICATION - .011728						MAGNIFICATION - .006659											
-6 GROUP LENGTH - 18.110MM (.713IN.)						-6 GROUP LENGTH - 13.502MM (.531IN.)						-6 GROUP LENGTH - 8.949MM (.352IN.)						-6 GROUP LENGTH - 3.554MM (.139IN.)											
GROUP						GROUP						GROUP						GROUP											
E	-6	-5	-4	-3	-2	-1	E	-6	-5	-4	-3	-2	-1	E	-6	-5	-4	-3	-2	-1	E	-6	-5	-4	-3	-2	-1		
L 1	7	1.3	2.4	5.3	10.4	21.1	L 1	7	1.3	2.4	5.3	10.7	21.3	L 1	7	1.3	2.7	5.3	10.7	21.3	42.6	L 1	7	1.3	2.7	5.3	10.7	21.3	42.6
E 2	7	1.7	3.4	5.9	11.8	23.6	E 2	7	1.7	3.4	6.0	12.0	23.9	E 2	7	1.5	3.0	6.0	12.0	23.9	47.9	E 2	7	1.5	3.0	6.0	12.0	23.9	47.9
M 3	8	1.7	3.4	6.6	13.3	25.5	M 3	8	1.7	3.4	6.7	13.4	26.9	M 3	8	1.7	3.4	6.7	13.4	26.9	53.7	M 3	8	1.7	3.4	6.7	13.4	26.9	53.7
E 4	9	1.4	3.7	7.4	14.9	27.8	E 4	9	1.2	2.5	5.0	10.0	20.0	E 4	9	1.9	3.8	7.5	15.1	30.1	60.3	E 4	9	1.9	3.8	7.5	15.1	30.1	60.3
M 5	1.0	2.1	4.2	4.4	10.7	33.4	M 5	1.4	2.4	5.6	11.2	22.4	40.0	M 5	1.4	2.4	5.6	11.2	22.4	40.0	67.7	M 5	1.4	2.4	5.6	11.2	22.4	40.0	67.7
T 6	1.2	2.3	4.7	4.6	10.4	37.5	T 6	1.6	3.1	6.3	12.6	25.2	50.3	T 6	1.6	3.1	6.3	12.6	25.2	50.3	76.0	T 6	1.6	3.1	6.3	12.6	25.2	50.3	76.0

FOCAL LENGTH - 1060MM												
OBJECT DISTANCE - 500.FT. (152.40M)												
MAGNIFICATION - .007004												
-6 GROUP LENGTH- 5.344MM (.2104IN.)												
GROUP												
E	-6	-5	-3	-2	-1	E	-6	-5	-3	-2	-1	
L 1	1.4	3.6	7.1	14.3	35.7	L 1	3.4	6.7	13.4	26.8	53.7	
E 2	2.0	4.0	8.0	20.0	40.1	E 2	3.8	7.5	15.1	30.1	60.2	
M 3	2.5	5.0	11.2	22.5	45.0	M 3	4.2	8.5	16.9	33.8	67.6	
E 4	3.2	6.3	12.6	25.2	50.5	E 4	4.7	9.5	19.0	37.9	75.9	
M 5	3.8	7.6	15.2	28.3	56.7	M 5	5.3	10.6	21.3	42.6	85.2	
T 6	4.4	8.8	17.6	31.8	63.6	T 6	6.0	12.0	23.9	47.8	95.6	

FOCAL LENGTH - 1060MM													
OBJECT DISTANCE - 1500.FT. (457.20M)													
MAGNIFICATION - .003224													
-6 GROUP LENGTH- 1.773MM (. 0698IN.)													
GROUP													
E	-6	-5	-4	-3	-2	-1	E	-6	-5	-4	-3	-2	-1
L 1	4.5	9.0	17.9	35.8	71.6	215.2	L 1	9.0	17.9	35.9	71.8	143.5	287.0
E 2	5.0	10.1	20.2	40.3	80.6	241.5	E 2	10.1	20.1	40.3	80.6	161.1	322.2
M 3	5.6	11.3	22.6	45.2	90.4	271.1	M 3	11.3	22.6	45.2	90.4	180.8	361.7
E 4	6.3	12.7	25.4	50.7	101.5	304.6	E 4	12.7	25.4	50.7	101.5	203.0	405.9
M 5	7.1	14.2	28.5	57.0	113.9	341.5	M 5	14.2	28.5	57.0	113.9	227.8	455.7
T 6	8.0	16.0	32.0	63.9	127.9	383.4	T 6	16.0	32.0	63.9	127.9	255.7	511.5

FOCAL LENGTH - 1060MM													
OBJECT DISTANCE - 4000.FT. (1219.20M)													
MAGNIFICATION - .000870													
-6 GROUP LENGTH - .664MM (.0261IN.)													
GROUP													
E	-6	-5	-4	-3	-2	-1	E	-6	-5	-4	-3	-2	-1
L 1	13.5	26.9	53.9	107.7	215.4	430.8	L 1	22.4	44.9	89.8	179.6	359.2	718.4
E 2	15.1	30.2	60.4	120.8	241.5	483.0	E 2	25.2	50.4	100.8	201.6	403.2	806.4
M 3	17.0	33.9	67.9	135.7	271.1	542.8	M 3	28.3	56.6	113.1	226.3	452.5	905.1
E 4	19.0	38.0	76.0	152.0	304.0	608.3	E 4	31.7	63.5	127.0	254.0	508.0	1016.0
M 5	21.4	42.7	85.4	170.8	341.5	683.0	M 5	35.6	71.3	142.5	285.1	570.2	1140.4
T 6	24.0	48.0	96.0	192.0	384.0	767.6	T 6	40.0	80.0	160.0	320.0	640.0	1280.0

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER) FOR 1060MM FOCAL LENGTH LENSES

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER) FOR 1200MM FOCAL LENGTH LENSES

	FOCAL LENGTH - 1200MM				FOCAL LENGTH - 1200MM				FOCAL LENGTH - 1200MM				FOCAL LENGTH - 1200MM							
	OBJECT DISTANCE- 100.FT.(30.48MM)				OBJECT DISTANCE- 200.FT.(60.96MM)				OBJECT DISTANCE- 300.FT.(91.44MM)				OBJECT DISTANCE- 300.FT.(91.44MM)							
	MAGNIFICATION - .00080				MAGNIFICATION - .020080				MAGNIFICATION - .013208				MAGNIFICATION - .013208							
	-A GROUP LENGTH-15.32MM(.6032IN.)				-A GROUP LENGTH-15.32MM(.6032IN.)				-A GROUP LENGTH-10.146MM(.3995IN.)				-A GROUP LENGTH-10.146MM(.3995IN.)							
	GROUP				GROUP				GROUP				GROUP							
	-0	-5	-4	-3	-6	-5	-4	-3	-6	-5	-4	-3	-6	-5	-4	-3	-6	-5	-4	-3
E	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
L	0.4	1.2	2.1	3.0	0.8	1.6	2.5	3.4	1.2	2.3	3.4	4.5	1.2	2.3	3.4	4.5	1.2	2.3	3.4	4.5
E	0.7	1.3	2.0	2.8	1.0	1.7	2.4	3.1	1.3	2.6	3.9	5.2	1.3	2.6	3.9	5.2	1.3	2.6	3.9	5.2
L	0.7	1.5	2.4	3.3	1.0	2.0	3.0	4.0	1.5	3.0	4.5	6.0	1.5	3.0	4.5	6.0	1.5	3.0	4.5	6.0
E	0.9	1.6	2.5	3.4	1.1	2.2	3.3	4.4	1.7	3.3	4.9	6.5	1.7	3.3	4.9	6.5	1.7	3.3	4.9	6.5
L	0.9	1.8	2.7	3.6	1.1	2.3	3.5	4.7	1.9	3.7	5.4	7.1	1.9	3.7	5.4	7.1	1.9	3.7	5.4	7.1
E	1.0	1.9	2.8	3.7	1.2	2.5	3.7	4.9	2.1	4.2	5.9	7.6	2.1	4.2	5.9	7.6	2.1	4.2	5.9	7.6
L	1.0	2.0	2.9	3.8	1.2	2.6	3.8	5.0	2.1	4.2	5.9	7.6	2.1	4.2	5.9	7.6	2.1	4.2	5.9	7.6
E	1.1	2.1	3.0	3.9	1.4	2.8	4.0	5.2	2.3	4.6	6.3	8.0	2.3	4.6	6.3	8.0	2.3	4.6	6.3	8.0
L	1.1	2.2	3.1	4.0	1.4	2.8	4.0	5.2	2.3	4.6	6.3	8.0	2.3	4.6	6.3	8.0	2.3	4.6	6.3	8.0
E	1.2	2.3	3.2	4.1	1.6	3.1	4.3	5.5	2.5	5.0	6.7	8.4	2.5	5.0	6.7	8.4	2.5	5.0	6.7	8.4
L	1.2	2.4	3.3	4.2	1.6	3.1	4.3	5.5	2.5	5.0	6.7	8.4	2.5	5.0	6.7	8.4	2.5	5.0	6.7	8.4
E	1.3	2.5	3.4	4.3	1.8	3.4	4.6	5.8	2.7	5.4	7.1	8.8	2.7	5.4	7.1	8.8	2.7	5.4	7.1	8.8
L	1.3	2.6	3.5	4.4	1.8	3.4	4.6	5.8	2.7	5.4	7.1	8.8	2.7	5.4	7.1	8.8	2.7	5.4	7.1	8.8
E	1.4	2.7	3.6	4.5	2.0	3.7	4.9	6.1	2.9	5.8	7.5	9.2	2.9	5.8	7.5	9.2	2.9	5.8	7.5	9.2
L	1.4	2.8	3.7	4.6	2.0	3.7	4.9	6.1	2.9	5.8	7.5	9.2	2.9	5.8	7.5	9.2	2.9	5.8	7.5	9.2
E	1.5	2.9	3.8	4.7	2.2	4.0	5.2	6.4	3.1	6.2	7.9	9.6	3.1	6.2	7.9	9.6	3.1	6.2	7.9	9.6
L	1.5	3.0	3.9	4.8	2.2	4.0	5.2	6.4	3.1	6.2	7.9	9.6	3.1	6.2	7.9	9.6	3.1	6.2	7.9	9.6
E	1.6	3.1	4.0	4.9	2.4	4.2	5.4	6.6	3.3	6.6	8.3	10.0	3.3	6.6	8.3	10.0	3.3	6.6	8.3	10.0
L	1.6	3.2	4.1	5.0	2.4	4.2	5.4	6.6	3.3	6.6	8.3	10.0	3.3	6.6	8.3	10.0	3.3	6.6	8.3	10.0
E	1.7	3.3	4.2	5.1	2.6	4.4	5.6	6.8	3.5	7.0	8.7	10.4	3.5	7.0	8.7	10.4	3.5	7.0	8.7	10.4
L	1.7	3.4	4.3	5.2	2.6	4.4	5.6	6.8	3.5	7.0	8.7	10.4	3.5	7.0	8.7	10.4	3.5	7.0	8.7	10.4
E	1.8	3.5	4.4	5.3	2.8	4.6	5.8	7.0	3.7	7.4	9.1	10.8	3.7	7.4	9.1	10.8	3.7	7.4	9.1	10.8
L	1.8	3.6	4.5	5.4	2.8	4.6	5.8	7.0	3.7	7.4	9.1	10.8	3.7	7.4	9.1	10.8	3.7	7.4	9.1	10.8
E	1.9	3.7	4.6	5.5	3.0	4.8	6.0	7.2	3.9	7.8	9.5	11.2	3.9	7.8	9.5	11.2	3.9	7.8	9.5	11.2
L	1.9	3.8	4.7	5.6	3.0	4.8	6.0	7.2	3.9	7.8	9.5	11.2	3.9	7.8	9.5	11.2	3.9	7.8	9.5	11.2
E	2.0	3.9	4.8	5.7	3.2	5.0	6.2	7.4	4.1	8.2	9.9	11.6	4.1	8.2	9.9	11.6	4.1	8.2	9.9	11.6
L	2.0	4.0	4.9	5.8	3.2	5.0	6.2	7.4	4.1	8.2	9.9	11.6	4.1	8.2	9.9	11.6	4.1	8.2	9.9	11.6
E	2.1	4.1	5.0	5.9	3.4	5.2	6.4	7.6	4.3	8.6	10.3	12.0	4.3	8.6	10.3	12.0	4.3	8.6	10.3	12.0
L	2.1	4.2	5.1	6.0	3.4	5.2	6.4	7.6	4.3	8.6	10.3	12.0	4.3	8.6	10.3	12.0	4.3	8.6	10.3	12.0
E	2.2	4.2	5.1	6.0	3.6	5.4	6.6	7.8	4.5	9.0	10.7	12.4	4.5	9.0	10.7	12.4	4.5	9.0	10.7	12.4
L	2.2	4.3	5.2	6.1	3.6	5.4	6.6	7.8	4.5	9.0	10.7	12.4	4.5	9.0	10.7	12.4	4.5	9.0	10.7	12.4
E	2.3	4.3	5.2	6.1	3.8	5.6	6.8	8.0	4.7	9.4	11.1	12.8	4.7	9.4	11.1	12.8	4.7	9.4	11.1	12.8
L	2.3	4.4	5.3	6.2	3.8	5.6	6.8	8.0	4.7	9.4	11.1	12.8	4.7	9.4	11.1	12.8	4.7	9.4	11.1	12.8
E	2.4	4.4	5.3	6.2	4.0	5.8	7.0	8.2	4.9	9.8	11.5	13.2	4.9	9.8	11.5	13.2	4.9	9.8	11.5	13.2
L	2.4	4.5	5.4	6.3	4.0	5.8	7.0	8.2	4.9	9.8	11.5	13.2	4.9	9.8	11.5	13.2	4.9	9.8	11.5	13.2
E	2.5	4.5	5.4	6.3	4.2	6.0	7.2	8.4	5.1	10.2	11.9	13.6	5.1	10.2	11.9	13.6	5.1	10.2	11.9	13.6
L	2.5	4.6	5.5	6.4	4.2	6.0	7.2	8.4	5.1	10.2	11.9	13.6	5.1	10.2	11.9	13.6	5.1	10.2	11.9	13.6
E	2.6	4.6	5.5	6.4	4.4	6.2	7.4	8.6	5.3	10.6	12.3	14.0	5.3	10.6	12.3	14.0	5.3	10.6	12.3	14.0
L	2.6	4.7	5.6	6.5	4.4	6.2	7.4	8.6	5.3	10.6	12.3	14.0	5.3	10.6	12.3	14.0	5.3	10.6	12.3	14.0
E	2.7	4.7	5.6	6.5	4.6	6.4	7.6	8.8	5.5	11.0	12.7	14.4	5.5	11.0	12.7	14.4	5.5	11.0	12.7	14.4
L	2.7	4.8	5.7	6.6	4.6	6.4	7.6	8.8	5.5	11.0	12.7	14.4	5.5	11.0	12.7	14.4	5.5	11.0	12.7	14.4
E	2.8	4.8	5.7	6.6	4.8	6.6	7.8	9.0	5.7	11.4	13.1	14.8	5.7	11.4	13.1	14.8	5.7	11.4	13.1	14.8
L	2.8	4.9	5.8	6.7	4.8	6.6	7.8	9.0	5.7	11.4	13.1	14.8	5.7	11.4	13.1	14.8	5.7	11.4	13.1	14.8
E	2.9	4.9	5.8	6.7	5.0	6.8	8.0	9.2	5.9	11.8	13.5	15.2	5.9	11.8	13.5	15.2	5.9	11.8	13.5	15.2
L	2.9	5.0	5.9	6.8	5.0	6.8	8.0	9.2	5.9	11.8	13.5	15.2	5.9	11.8	13.5	15.2	5.9	11.8	13.5	15.2
E	3.0	5.0	5.9	6.8	5.2	7.0	8.2	9.4	6.1	12.2	13.9	15.6	6.1	12.2	13.9	15.6	6.1	12.2	13.9	15.6
L	3.0	5.1	6.0	6.9	5.2	7.0	8.2	9.4	6.1	12.2	13.9	15.6	6.1	12.2	13.9	15.6	6.1	12.2	13.9	15.6
E	3.1	5.1	6.0	6.9	5.4	7.2	8.4	9.6	6.3	12.6	14.3	16.0	6.3	12.6	14.3	16.0	6.3	12.6	14.3	16.0
L	3.1	5.2	6.1	7.0	5.4	7.2	8.4	9.6	6.3	12.6	14.3	16.0	6.3	12.6	14.3	16.0	6.3	12.6	14.3	16.0
E	3.2	5.2	6.1	7.0	5.6	7.4	8.6	9.8	6.5	13.0	14.7	16.4	6.5	13.0	14.7	16.4	6.5	13.0	14.7	16.4
L	3.2	5.3	6.2	7.1	5.6	7.4	8.6	9.8	6.5	13.0	14.7	16.4	6.5	13.0	14.7	16.4	6.5	13.0	14.7	16.4
E	3.3	5.3	6.2	7.1	5.8	7.6	8.8	10.0	6.7	13.4	15.1	16.8	6.7	13.4	15.1	16.8	6.7	13.4	15.1	16.8
L	3.3	5.4	6.3	7.2	5.8	7.6	8.8	10.0	6.7	13.4	15.1	16.8	6.7	13.4	15.1	16.8	6.7	13.4	15.1	16.8
E	3.4	5.4	6.3	7.2	6.0	7.8	9.0	10.2	6.9	13.8	15.5	17.2	6.9	13.8	15.5	17.2	6.9	13.8	15.5	17.2
L	3.4	5.5	6.4	7.3	6.0	7.8	9.0	10.2	6.9	13.8	15.5	17.2	6.9	13.8	15.5	17.2	6.9	13.8	15.5	17.2
E	3.5	5.5	6.4	7.3	6.2	8.0	9.2	10.4	7.1	14.2	15.9	17.6	7.1	14.2	15.9	17.6	7.1	14.2	15.9	17.6
L	3.5	5.6	6.5	7.4	6.2	8.0	9.2	10.4	7.1	14.2	15.9	17.6	7.1	14.2	15.9	17.6	7.1	14.2	15.9	17.6
E	3.6	5.6	6.5	7.4	6.4	8.2	9.4	10.6	7.3	14.6	16.3	18.0	7.3	14.6	16.3	18.0	7.3	14.6	16.3	18.0
L	3.6	5.7	6.6	7.5	6.4	8.2	9.4	10.6	7.3	14.6	16.3	18.0	7.3	14.6	16.3	18.0	7.3	14.6	16.3	18.0
E	3.7	5.7	6.6	7.5	6.6	8.4	9.6	10.8	7.5	15.0	16.7	18.4	7.5	15.0	16.7	18.4	7.5	15.0	16.7	18.4
L	3.7	5.8	6.7	7.6	6.6	8.4	9.6	10.8	7.5	15.0	16.7	18.4	7.5	15.0	16.7	18.4	7.5	15.0	16.7	18.4
E	3.8	5.8	6.7	7.6	6.8	8.6	9.8	11.0	7.7	15.4	17.1	18.8	7.7	15.4	17.1	18.8	7.7	15.4	17.1	18.8
L	3.8	5.9	6.8	7.7	6.8	8.6	9.8	11.0	7.7	15.4	17.1	18.8	7.7	15.4	17.1	18.8	7.7	15.4	17.1	18.8
E	3.9	5.9	6.8	7.7	7.0	8.8	10.0	11.2	7.9	15.8	17.5	19.2	7.9	15.8	17.5	19.2	7.9	15.8	17.5	19.2
L	3.9	6.0	6.9	7.8	7.0	8.8	10.0	11.2	7.9	15.8	17.5	19.2	7.9	15.8	17.5	19.2	7.9	15.8	17.5	19.2
E	4.0	6.0	6.9	7.8	7.2	9.0	10.2	11.4	8.1	16.2	17.9	19.6	8.1	16.2	17.9	19.6	8.1	16.2	17.9	19.6
L	4.0	6.1	7.0	7.9	7.2	9.0	10.2	11.4	8.1	16.2	17.9	19.6	8.1	16.2	17.9	19.6	8.1	16		

	1200MM				500.FT.(152.40M)				1200MM				500.FT.(152.40M)			
	Focal Length				Object Distance				Focal Length				Object Distance			
	Magnification				Magnification				Magnification				Magnification			
	-6 Group Length				-6 Group Length				-6 Group Length				-6 Group Length			
E	-4	-3	-2	-1	-4	-3	-2	-1	-4	-3	-2	-1	-4	-3	-2	-1
L	1.6	3.1	6.1	12.4	25.3	50.3	100.3	200.3	1.6	3.1	6.1	12.4	25.3	50.3	100.3	200.3
E	1	1.6	3.1	6.1	12.4	25.3	50.3	100.3	1	1.6	3.1	6.1	12.4	25.3	50.3	100.3
L	2	3.1	6.1	12.4	25.3	50.3	100.3	200.3	L	2	3.1	6.1	12.4	25.3	50.3	100.3
E	3	6.1	12.4	25.3	50.3	100.3	200.3	400.3	E	3	6.1	12.4	25.3	50.3	100.3	200.3
L	4	12.4	25.3	50.3	100.3	200.3	400.3	800.3	L	4	12.4	25.3	50.3	100.3	200.3	400.3
E	5	25.3	50.3	100.3	200.3	400.3	800.3	1600.3	E	5	25.3	50.3	100.3	200.3	400.3	800.3
L	6	50.3	100.3	200.3	400.3	800.3	1600.3	3200.3	L	6	50.3	100.3	200.3	400.3	800.3	1600.3

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

[illegible]

TRADE NAME RESOLUTION (LINES PER MILLIMETER) FOR 1000MM FOCAL LENGTH LENSES

[illegible]

	1400MM				1400MM			
	FOCAL LENGTH	OBJECT DISTANCE	MAGNIFICATION	-6 GROUP LENGTH	FOCAL LENGTH	OBJECT DISTANCE	MAGNIFICATION	-6 GROUP LENGTH
E	-4	-5	-1	-2	-4	-5	-1	-2
L	1	3.0	9.7	14.5	1	3.4	9.7	14.5
E	2	1.7	3.0	27.0	2	3.4	30.6	27.1
L	3	7.0	15.1	30.3	3	3.6	30.4	30.4
E	4	2.1	6.2	17.0	4	4.3	17.1	17.2
L	5	9.5	19.1	38.1	5	4.8	19.2	19.2
E	6	2.0	4.0	14.0	6	5.4	14.6	14.6
L	7	10.7	21.0	41.0	7	6.0	21.1	21.1
E	8	2.7	4.0	14.0	8	6.0	12.1	12.1
L	9	10.7	21.0	41.0	9	6.0	12.1	12.1
E	10	2.7	4.0	14.0	10	6.0	12.1	12.1
L	11	10.7	21.0	41.0	11	6.0	12.1	12.1
E	12	2.7	4.0	14.0	12	6.0	12.1	12.1
L	13	10.7	21.0	41.0	13	6.0	12.1	12.1
E	14	2.7	4.0	14.0	14	6.0	12.1	12.1
L	15	10.7	21.0	41.0	15	6.0	12.1	12.1
E	16	2.7	4.0	14.0	16	6.0	12.1	12.1
L	17	10.7	21.0	41.0	17	6.0	12.1	12.1
E	18	2.7	4.0	14.0	18	6.0	12.1	12.1
L	19	10.7	21.0	41.0	19	6.0	12.1	12.1
E	20	2.7	4.0	14.0	20	6.0	12.1	12.1
L	21	10.7	21.0	41.0	21	6.0	12.1	12.1
E	22	2.7	4.0	14.0	22	6.0	12.1	12.1
L	23	10.7	21.0	41.0	23	6.0	12.1	12.1
E	24	2.7	4.0	14.0	24	6.0	12.1	12.1
L	25	10.7	21.0	41.0	25	6.0	12.1	12.1
E	26	2.7	4.0	14.0	26	6.0	12.1	12.1
L	27	10.7	21.0	41.0	27	6.0	12.1	12.1
E	28	2.7	4.0	14.0	28	6.0	12.1	12.1
L	29	10.7	21.0	41.0	29	6.0	12.1	12.1
E	30	2.7	4.0	14.0	30	6.0	12.1	12.1
L	31	10.7	21.0	41.0	31	6.0	12.1	12.1
E	32	2.7	4.0	14.0	32	6.0	12.1	12.1
L	33	10.7	21.0	41.0	33	6.0	12.1	12.1
E	34	2.7	4.0	14.0	34	6.0	12.1	12.1
L	35	10.7	21.0	41.0	35	6.0	12.1	12.1
E	36	2.7	4.0	14.0	36	6.0	12.1	12.1
L	37	10.7	21.0	41.0	37	6.0	12.1	12.1
E	38	2.7	4.0	14.0	38	6.0	12.1	12.1
L	39	10.7	21.0	41.0	39	6.0	12.1	12.1
E	40	2.7	4.0	14.0	40	6.0	12.1	12.1
L	41	10.7	21.0	41.0	41	6.0	12.1	12.1
E	42	2.7	4.0	14.0	42	6.0	12.1	12.1
L	43	10.7	21.0	41.0	43	6.0	12.1	12.1
E	44	2.7	4.0	14.0	44	6.0	12.1	12.1
L	45	10.7	21.0	41.0	45	6.0	12.1	12.1

[illegible]

	1400MM				1400MM			
	FOCAL LENGTH	OBJECT DISTANCE	MAGNIFICATION	-6 GROUP LENGTH	FOCAL LENGTH	OBJECT DISTANCE	MAGNIFICATION	-6 GROUP LENGTH
	mm	mm	x	mm	mm	mm	x	mm
1	13.5	140.0	10.4	140.0	13.5	140.0	10.4	140.0
2	13.5	140.0	10.4	140.0	13.5	140.0	10.4	140.0
3	13.5	140.0	10.4	140.0	13.5	140.0	10.4	140.0
4	13.5	140.0	10.4	140.0	13.5	140.0	10.4	140.0
5	13.5	140.0	10.4	140.0	13.5	140.0	10.4	140.0
6	13.5	140.0	10.4	140.0	13.5	140.0	10.4	140.0
7	13.5	140.0	10.4	140.0	13.5	140.0	10.4	140.0
8	13.5	140.0	10.4	140.0	13.5	140.0	10.4	140.0
9	13.5	140.0	10.4	140.0	13.5	140.0	10.4	140.0
10	13.5	140.0	10.4	140.0	13.5	140.0	10.4	140.0
11	13.5	140.0	10.4	140.0	13.5	140.0	10.4	140.0
12	13.5	140.0	10.4	140.0	13.5	140.0	10.4	140.0
13	13.5	140.0	10.4	140.0	13.5	140.0	10.4	140.0
14	13.5	140.0	10.4	140.0	13.5	140.0	10.4	140.0
15	13.5	140.0	10.4	140.0	13.5	140.0	10.4	140.0
16	13.5	140.0	10.4	140.0	13.5	140.0	10.4	140.0
17	13.5	140.0	10.4	140.0	13.5	140.0	10.4	140.0
18	13.5	140.0	10.4	140.0	13.5	140.0	10.4	140.0
19	13.5	140.0	10.4	140.0	13.5	140.0	10.4	140.0
20	13.5	140.0	10.4	140.0	13.5	140.0	10.4	140.0
21	13.5	140.0	10.4	140.0	13.5	140.0	10.4	140.0
22	13.5	140.0	10.4	140.0	13.5	140.0	10.4	140.0
23	13.5	140.0	10.4	140.0	13.5	140.0	10.4	140.0
24	13.5	140.0	10.4	140.0	13.5	140.0	10.4	140.0
25	13.5	140.0	10.4	140.0	13.5	140.0	10.4	140.0
26	13.5	140.0	10.4	140.0	13.5	140.0	10.4	140.0
27	13.5	140.0	10.4	140.0	13.5	140.0	10.4	140.0
28	13.5	140.0	10.4	140.0	13.5	140.0	10.4	140.0
29	13.5	140.0	10.4	140.0	13.5	140.0	10.4	140.0
30	13.5	140.0	10.4	140.0	13.5	140.0	10.4	140.0

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER) FOR 1600MM FOCAL LENGTH LENSES

	1600MM				1600MM			
	FOCAL LENGTH	OBJECT DISTANCE	MAGNIFICATION	-6 GROUP LENGTH	FOCAL LENGTH	OBJECT DISTANCE	MAGNIFICATION	-6 GROUP LENGTH
2	-6	-2	-1	-3	-6	-2	-1	-3
1	-5	-1	1	-4	-5	1	2	-4
L	1-2	2-3	1-1	3-5	1-2	2-3	1-1	3-5
E	1-3	2-4	1-2	3-6	1-3	2-4	1-2	3-6
M	1-4	2-5	1-3	4-7	1-4	2-5	1-3	4-8
E	1-5	2-6	1-4	4-8	1-5	2-6	1-4	4-9
M	1-6	2-7	1-5	5-9	1-6	2-7	1-5	5-10
E	1-7	2-8	1-6	5-10	1-7	2-8	1-6	5-11
M	1-8	2-9	1-7	6-11	1-8	2-9	1-7	6-12
E	1-9	2-10	1-8	6-12	1-9	2-10	1-8	6-13
M	1-10	2-11	1-9	6-13	1-10	2-11	1-9	6-14
E	1-11	2-12	1-10	6-14	1-11	2-12	1-10	6-15
M	1-12	2-13	1-11	6-15	1-12	2-13	1-11	6-16
E	1-13	2-14	1-12	6-16	1-13	2-14	1-12	6-17
M	1-14	2-15	1-13	6-17	1-14	2-15	1-13	6-18
E	1-15	2-16	1-14	6-18	1-15	2-16	1-14	6-19
M	1-16	2-17	1-15	6-19	1-16	2-17	1-15	6-20
E	1-17	2-18	1-16	6-20	1-17	2-18	1-16	6-21
M	1-18	2-19	1-17	6-21	1-18	2-19	1-17	6-22
E	1-19	2-20	1-18	6-22	1-19	2-20	1-18	6-23
M	1-20	2-21	1-19	6-23	1-20	2-21	1-19	6-24
E	1-21	2-22	1-20	6-24	1-21	2-22	1-20	6-25
M	1-22	2-23	1-21	6-25	1-22	2-23	1-21	6-26
E	1-23	2-24	1-22	6-26	1-23	2-24	1-22	6-27
M	1-24	2-25	1-23	6-27	1-24	2-25	1-23	6-28
E	1-25	2-26	1-24	6-28	1-25	2-26	1-24	6-29
M	1-26	2-27	1-25	6-29	1-26	2-27	1-25	6-30
E	1-27	2-28	1-26	6-30	1-27	2-28	1-26	6-31
M	1-28	2-29	1-27	6-31	1-28	2-29	1-27	6-32
E	1-29	2-30	1-28	6-32	1-29	2-30	1-28	6-33
M	1-30	2-31	1-29	6-33	1-30	2-31	1-29	6-34
E	1-31	2-32	1-30	6-34	1-31	2-32	1-30	6-35
M	1-32	2-33	1-31	6-35	1-32	2-33	1-31	6-36
E	1-33	2-34	1-32	6-36	1-33	2-34	1-32	6-37
M	1-34	2-35	1-33	6-37	1-34	2-35	1-33	6-38
E	1-35	2-36	1-34	6-38	1-35	2-36	1-34	6-39
M	1-36	2-37	1-35	6-39	1-36	2-37	1-35	6-40
E	1-37	2-38	1-36	6-40	1-37	2-38	1-36	6-41
M	1-38	2-39	1-37	6-41	1-38	2-39	1-37	6-42
E	1-39	2-40	1-38	6-42	1-39	2-40	1-38	6-43
M	1-40	2-41	1-39	6-43	1-40	2-41	1-39	6-44
E	1-41	2-42	1-40	6-44	1-41	2-42	1-40	6-45
M	1-42	2-43	1-41	6-45	1-42	2-43	1-41	6-46
E	1-43	2-44	1-42	6-46	1-43			

[illegible][illegible]

	1600MM				1600MM				1600MM						
	FOCAL LENGTH	OBJECT DISTANCE	MAGNIFICATION	GROUP	FOCAL LENGTH	OBJECT DISTANCE	MAGNIFICATION	GROUP	FOCAL LENGTH	OBJECT DISTANCE	MAGNIFICATION	GROUP			
1	11.4	24.7	45.1	190.2	1.00	11.4	24.7	45.1	190.2	1.00	11.4	24.7	45.1	190.2	1.00
2	13.3	24.7	45.1	190.2	1.00	13.3	24.7	45.1	190.2	1.00	13.3	24.7	45.1	190.2	1.00
3	15.0	24.7	45.1	190.2	1.00	15.0	24.7	45.1	190.2	1.00	15.0	24.7	45.1	190.2	1.00
4	16.8	24.7	45.1	190.2	1.00	16.8	24.7	45.1	190.2	1.00	16.8	24.7	45.1	190.2	1.00
5	18.4	24.7	45.1	190.2	1.00	18.4	24.7	45.1	190.2	1.00	18.4	24.7	45.1	190.2	1.00
6	21.2	24.7	45.1	190.2	1.00	21.2	24.7	45.1	190.2	1.00	21.2	24.7	45.1	190.2	1.00

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER) FOR 1600MM FOCAL LENGTH LENSES

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER) FOR 2000MM FOCAL LENGTH LENSES

FOCAL LENGTH - 2000MM		FOCAL LENGTH - 2000MM		FOCAL LENGTH - 2000MM		FOCAL LENGTH - 2000MM	
OBJECT DISTANCE - 500.FT. (152.40M)		OBJECT DISTANCE - 1000.FT. (304.80M)		OBJECT DISTANCE - 1000.FT. (304.80M)		OBJECT DISTANCE - 1000.FT. (304.80M)	
MAGNIFICATION - .01329		MAGNIFICATION - .00665		MAGNIFICATION - .00665		MAGNIFICATION - .00665	
-6 GROUP LENGTH-10.16MM (.395IN.)		-6 GROUP LENGTH-12.725MM (.5010IN.)		-6 GROUP LENGTH-12.725MM (.5010IN.)		-6 GROUP LENGTH-12.725MM (.5010IN.)	
GROUP		GROUP		GROUP		GROUP	
E	-5	-3	-2	-1	-1	-1	-1
L 1	1.0	2.0	3.0	4.0	5.0	6.0	7.0
L 2	1.0	1.0	1.0	1.0	1.0	1.0	1.0
M 3	1.0	1.0	1.0	1.0	1.0	1.0	1.0
E 4	1.0	1.0	1.0	1.0	1.0	1.0	1.0
M 5	1.0	1.0	1.0	1.0	1.0	1.0	1.0
T 6	1.0	1.0	1.0	1.0	1.0	1.0	1.0

FOCAL LENGTH - 2000MM		FOCAL LENGTH - 2000MM		FOCAL LENGTH - 2000MM		FOCAL LENGTH - 2000MM	
OBJECT DISTANCE - 1500.FT. (457.20M)		OBJECT DISTANCE - 1500.FT. (457.20M)		OBJECT DISTANCE - 1500.FT. (457.20M)		OBJECT DISTANCE - 1500.FT. (457.20M)	
MAGNIFICATION - .00454		MAGNIFICATION - .00454		MAGNIFICATION - .00454		MAGNIFICATION - .00454	
-6 GROUP LENGTH-3.352MM (.1320IN.)		-6 GROUP LENGTH-3.352MM (.1320IN.)		-6 GROUP LENGTH-3.352MM (.1320IN.)		-6 GROUP LENGTH-3.352MM (.1320IN.)	
GROUP		GROUP		GROUP		GROUP	
E	-5	-3	-2	-1	-1	-1	-1
L 1	1.0	1.0	1.0	1.0	1.0	1.0	1.0
L 2	1.0	1.0	1.0	1.0	1.0	1.0	1.0
M 3	1.0	1.0	1.0	1.0	1.0	1.0	1.0
E 4	1.0	1.0	1.0	1.0	1.0	1.0	1.0
M 5	1.0	1.0	1.0	1.0	1.0	1.0	1.0
T 6	1.0	1.0	1.0	1.0	1.0	1.0	1.0

FOCAL LENGTH - 2000MM		FOCAL LENGTH - 2000MM		FOCAL LENGTH - 2000MM		FOCAL LENGTH - 2000MM	
OBJECT DISTANCE - 4000.FT. (1219.20M)		OBJECT DISTANCE - 4000.FT. (1219.20M)		OBJECT DISTANCE - 4000.FT. (1219.20M)		OBJECT DISTANCE - 4000.FT. (1219.20M)	
MAGNIFICATION - .001443		MAGNIFICATION - .001443		MAGNIFICATION - .001443		MAGNIFICATION - .001443	
-6 GROUP LENGTH-1.254MM (.0494IN.)		-6 GROUP LENGTH-1.254MM (.0494IN.)		-6 GROUP LENGTH-1.254MM (.0494IN.)		-6 GROUP LENGTH-1.254MM (.0494IN.)	
GROUP		GROUP		GROUP		GROUP	
E	-5	-3	-2	-1	-1	-1	-1
L 1	1.0	1.0	1.0	1.0	1.0	1.0	1.0
L 2	1.0	1.0	1.0	1.0	1.0	1.0	1.0
M 3	1.0	1.0	1.0	1.0	1.0	1.0	1.0
E 4	1.0	1.0	1.0	1.0	1.0	1.0	1.0
M 5	1.0	1.0	1.0	1.0	1.0	1.0	1.0
T 6	1.0	1.0	1.0	1.0	1.0	1.0	1.0

FOCAL LENGTH - 2000MM		FOCAL LENGTH - 2000MM		FOCAL LENGTH - 2000MM		FOCAL LENGTH - 2000MM	
OBJECT DISTANCE - 10000.FT. (3048.00M)		OBJECT DISTANCE - 10000.FT. (3048.00M)		OBJECT DISTANCE - 10000.FT. (3048.00M)		OBJECT DISTANCE - 10000.FT. (3048.00M)	
MAGNIFICATION - .000657		MAGNIFICATION - .000657		MAGNIFICATION - .000657		MAGNIFICATION - .000657	
-6 GROUP LENGTH-.501MM (.0197IN.)		-6 GROUP LENGTH-.501MM (.0197IN.)		-6 GROUP LENGTH-.501MM (.0197IN.)		-6 GROUP LENGTH-.501MM (.0197IN.)	
GROUP		GROUP		GROUP		GROUP	
E	-5	-3	-2	-1	-1	-1	-1
L 1	1.0	1.0	1.0	1.0	1.0	1.0	1.0
L 2	1.0	1.0	1.0	1.0	1.0	1.0	1.0
M 3	1.0	1.0	1.0	1.0	1.0	1.0	1.0
E 4	1.0	1.0	1.0	1.0	1.0	1.0	1.0
M 5	1.0	1.0	1.0	1.0	1.0	1.0	1.0
T 6	1.0	1.0	1.0	1.0	1.0	1.0	1.0

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER) FOR 2000MM FOCAL LENGTH LENSES

SECTION (C)

TABULATION OF CAMERA SYSTEM MAGNIFICATIONS
AND RESULTANT IMAGE SIZES

IDENTIFICATION

.000139	.157	INCH	.00420
.000143	.110		.00432
.000147	.113		.00445
.000152	.116		.00458
.000156	.120		.00471
.000161	.123		.00485
.000166	.127		.00499
.000170	.131		.00514
.000175	.134		.00529
.000181	.138		.00544
.000186	.142		.00559
.000191	.147		.00577
.000197	.151		.00590
.000203	.155		.00611
.000209	.160		.00629
.000215	.164		.00647
.000221	.169		.00666
.000227	.174		.00686
.000234	.179		.00706
.000241	.185		.00727
.000248	.190		.00748
.000255	.196		.00770
.000263	.201		.00792
.000270	.207		.00816
.000278	.213		.00840
.000287	.220		.00864
.000295	.226		.00890
.000304	.233		.00916
.000312	.239		.00942
.000322	.246		.00970
.000331	.254		.00996
.000341	.261		.01028
.000351	.269		.01058
.000361	.277		.01089
.000372	.285		.01121
.000383	.293		.01154
.000394	.302		.01187
.000405	.310		.01222
.000417	.320		.01258
.000429	.329		.01295
.000442	.339		.01333
.000455	.348		.01372
.000468	.359		.01412
.000482	.369		.01453
.000496	.380		.01496
.000511	.391		.01540
.000526	.403		.01585
.000541	.414		.01631
.000557	.427		.01679
.000573	.439		.01728
.000590	.452		.01779
.000607	.465		.01831
.000625	.479		.01885
.000643	.493		.01940
.000662	.507		.01997
.000682	.522		.02055

MAGNIFICATION

MM GROUP LENGTH
INCH

.020702	.537	.02116
.000722	.553	.02178
.000743	.569	.02241
.000765	.586	.02307
.000787	.603	.02375
.000811	.621	.02444
.000834	.639	.02516
.000859	.659	.02590
.000884	.677	.02666
.000910	.697	.02744
.000936	.717	.02824
.000964	.738	.02907
.000992	.760	.02992
.001021	.782	.03080
.001051	.805	.03170
.001082	.829	.03263
.001114	.853	.03358
.001146	.878	.03457
.001180	.904	.03558
.001214	.930	.03662
.001250	.957	.03770
.001287	.986	.03880
.001324	1.014	.03994
.001363	1.044	.04111
.001403	1.075	.04231
.001444	1.106	.04355
.001487	1.139	.04483
.001530	1.172	.04614
.001575	1.206	.04750
.001621	1.242	.04889
.001669	1.278	.05032
.001717	1.316	.05179
.001768	1.354	.05331
.001820	1.394	.05487
.001873	1.435	.05646
.001928	1.477	.05814
.001984	1.520	.05984
.002042	1.564	.06159
.002102	1.610	.06340
.002164	1.658	.06526
.002227	1.706	.06717
.002293	1.756	.06914
.002360	1.808	.07116
.002429	1.860	.07325
.002500	1.915	.07539
.002573	1.971	.07760
.002649	2.029	.07988
.002726	2.088	.08222
.002806	2.150	.08462
.002888	2.213	.08711
.002973	2.277	.08966
.003060	2.344	.09229
.003150	2.413	.09499
.003242	2.483	.09777
.003337	2.556	.10064
.003435	2.631	.10359

MAGNIFICATION	MM	GROUP LENGTH	INCH
.003536	2.766		.10862
.003639	2.788		.10975
.003760	2.809		.11200
.003850	2.823		.11027
.003969	3.000		.11948
.004085	3.129		.12318
.004204	3.221		.12680
.004328	3.315		.13051
.004454	3.412		.13434
.004585	3.512		.13827
.004719	3.615		.14232
.004858	3.721		.14649
.005000	3.830		.15079
.005147	3.942		.15521
.005297	4.058		.15975
.005453	4.177		.16443
.005612	4.299		.16925
.005777	4.425		.17421
.005946	4.555		.17932
.006120	4.688		.18457
.006300	4.825		.18998
.006484	4.967		.19553
.006674	5.112		.20129
.006870	5.262		.20717
.007071	5.416		.21325
.007278	5.575		.21944
.007492	5.739		.22563
.007711	5.907		.23255
.007937	6.080		.23936
.008170	6.258		.24637
.008409	6.441		.25359
.008655	6.630		.26102
.008909	6.824		.26867
.009170	7.024		.27655
.009439	7.230		.28465
.009713	7.442		.29299
.010000	7.660		.30157
.010293	7.884		.31041
.010595	8.115		.31951
.010905	8.353		.32887
.011225	8.598		.33851
.011554	8.850		.34843
.011892	9.109		.35863
.012241	9.376		.36914
.012599	9.651		.37996
.012968	9.934		.39109
.013348	10.225		.40255
.013740	10.524		.41435
.014142	10.833		.42649
.014557	11.150		.43899
.014983	11.477		.45185
.015422	11.813		.46509
.015876	12.159		.47872
.016339	12.516		.49275
.016818	12.883		.50719
.017311	13.260		.52205

MAGNIFICATION	MM	INCH
.017616	13.649	.53735
.018340	14.049	.55309
.018877	14.460	.56930
.019431	14.884	.58598
.020000	15.320	.60315
.020586	15.769	.62082
.021189	16.231	.63901
.021810	16.707	.65774
.022449	17.196	.67701
.023107	17.700	.69685
.023784	18.219	.71727
.024481	18.753	.73829
.025198	19.302	.75992
.025937	19.866	.78219
.026697	20.450	.80511
.027479	21.049	.82870
.028284	21.666	.85298
.029113	22.301	.87798
.029966	22.954	.90370
.030844	23.627	.93016
.031748	24.319	.95744
.032678	25.032	.98550
.033636	25.765	1.01437
.034621	26.520	1.04410

NOLTR 72-18

SECTION (D)

RESOLVING POWER DATA TABLES
FOR SPECIFIC CAMERA MAGNIFICATIONS

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER)

MAGNIFICATION -		.000139	
-6 GROUP LENGTH-		.107MM (.0042IN.)	
GROUP		GROUP	
	-6	-5	-4
E	112.2	224.5	449.0
L 1	126.0	252.0	504.0
L 2	141.4	282.8	565.7
M 3	158.7	317.5	635.0
E 4	178.2	356.4	712.7
N 5	200.0	400.0	800.0
T 6			

MAGNIFICATION -		.000152	
-6 GROUP LENGTH-		.116MM (.0044IN.)	
GROUP		GROUP	
E	-4	-5	-4
L 1	102.9	205.9	411.7
L 2	115.5	231.1	462.2
M 3	129.7	259.4	518.7
M 4	145.6	291.1	582.3
N 5	163.4	326.8	653.6
T 6	183.4	366.8	733.6
		-3	-2
		823.4	999.9
		924.3	999.9
		999.9	999.9
		999.9	999.9
		999.9	999.9
		999.9	999.9
		999.9	999.9
		999.9	999.9
		999.9	999.9
		999.9	999.9

MAGNIFICATION -		.000166	
-6 GROUP LENGTH-		.127MM (.0050IN.)	
GROUP		GROUP	
	-6	-5	-4
E 1	94.4	148.8	377.5
L 2	105.9	211.9	423.8
M 3	118.9	237.8	475.7
E 4	133.5	267.0	533.9
N 5	149.8	299.7	599.3
T 6	168.2	336.4	672.7
		-3	-2
		755.1	999.9
		847.6	999.9
		951.4	999.9
		999.9	999.9
		999.9	999.9
		999.9	999.9
		999.9	999.9

MAGNIFICATION -		.000181	
-6 GROUP LENGTH-		.138MM (.0054IN.)	
GROUP		GROUP	
	-6	-5	-4
E	86.6	173.1	346.2
L 1	97.2	194.3	388.6
L 2	109.0	218.1	436.2
M 3	122.4	244.8	489.6
E 4	137.4	274.8	549.6
N 5	154.2	308.4	616.9
T 6			

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER)

MAGNIFICATION - .000197		MAGNIFICATION - .000203		MAGNIFICATION - .000209	
-6 GROUP LENGTH- .151MM (.0054IN.)		-6 GROUP LENGTH- .155MM (.0061IN.)		-6 GROUP LENGTH- .160MM (.0063IN.)	
GROUP		GROUP		GROUP	
-6	-5	-6	-5	-6	-5
-5	-4	-5	-4	-5	-4
-4	-3	-4	-3	-4	-3
-3	-2	-3	-2	-3	-2
-2	-1	-2	-1	-2	-1
-1		-1		-1	
0		0		0	
1		1		1	
2		2		2	
3		3		3	
4		4		4	
5		5		5	
6		6		6	

MAGNIFICATION - .000215		MAGNIFICATION - .000221		MAGNIFICATION - .000227	
-6 GROUP LENGTH- .164MM (.0065IN.)		-6 GROUP LENGTH- .169MM (.0067IN.)		-6 GROUP LENGTH- .174MM (.0069IN.)	
GROUP		GROUP		GROUP	
-6	-5	-6	-5	-6	-5
-5	-4	-5	-4	-5	-4
-4	-3	-4	-3	-4	-3
-3	-2	-3	-2	-3	-2
-2	-1	-2	-1	-2	-1
-1		-1		-1	
0		0		0	
1		1		1	
2		2		2	
3		3		3	
4		4		4	
5		5		5	
6		6		6	

MAGNIFICATION - .000234		MAGNIFICATION - .000241		MAGNIFICATION - .000248	
-6 GROUP LENGTH- .179MM (.0071IN.)		-6 GROUP LENGTH- .185MM (.0073IN.)		-6 GROUP LENGTH- .190MM (.0075IN.)	
GROUP		GROUP		GROUP	
-6	-5	-6	-5	-6	-5
-5	-4	-5	-4	-5	-4
-4	-3	-4	-3	-4	-3
-3	-2	-3	-2	-3	-2
-2	-1	-2	-1	-2	-1
-1		-1		-1	
0		0		0	
1		1		1	
2		2		2	
3		3		3	
4		4		4	
5		5		5	
6		6		6	

MAGNIFICATION - .000255		MAGNIFICATION - .000263		MAGNIFICATION - .000270	
-6 GROUP LENGTH- .196MM (.0077IN.)		-6 GROUP LENGTH- .201MM (.0079IN.)		-6 GROUP LENGTH- .207MM (.0082IN.)	
GROUP		GROUP		GROUP	
-6	-5	-6	-5	-6	-5
-5	-4	-5	-4	-5	-4
-4	-3	-4	-3	-4	-3
-3	-2	-3	-2	-3	-2
-2	-1	-2	-1	-2	-1
-1		-1		-1	
0		0		0	
1		1		1	
2		2		2	
3		3		3	
4		4		4	
5		5		5	
6		6		6	

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER)

MAGNIFICATION - .000270		MAGNIFICATION - .000287		MAGNIFICATION - .000295	
-6 GROUP LENGTH-		-6 GROUP LENGTH-		-6 GROUP LENGTH-	
GROUP		GROUP		GROUP	
-6	-5	-6	-5	-6	-5
54.1	112.2	54.5	109.1	52.0	105.9
63.0	126.0	61.2	122.4	59.5	118.9
70.7	141.4	68.7	137.4	66.7	133.5
79.4	158.7	77.1	154.2	74.9	149.8
89.1	178.2	86.6	173.1	84.1	168.2
100.0	200.0	97.2	194.3	94.4	188.6
E	L	E	L	E	L
1	1	1	1	1	1
2	2	2	2	2	2
3	3	3	3	3	3
4	4	4	4	4	4
5	5	5	5	5	5
6	6	6	6	6	6

MAGNIFICATION - .000304		MAGNIFICATION - .000312		MAGNIFICATION - .000322	
-6 GROUP LENGTH-		-6 GROUP LENGTH-		-6 GROUP LENGTH-	
GROUP		GROUP		GROUP	
-6	-5	-6	-5	-6	-5
51.5	102.9	50.0	100.0	48.6	97.2
57.8	115.3	56.1	112.3	54.5	109.1
64.8	129.7	63.0	126.0	61.2	122.4
72.6	145.6	70.7	141.4	68.7	137.4
81.7	163.4	79.4	158.7	77.1	154.2
91.7	183.4	89.1	178.2	86.6	173.1
E	L	E	L	E	L
1	1	1	1	1	1
2	2	2	2	2	2
3	3	3	3	3	3
4	4	4	4	4	4
5	5	5	5	5	5
6	6	6	6	6	6

MAGNIFICATION - .000331		MAGNIFICATION - .000341		MAGNIFICATION - .000351	
-6 GROUP LENGTH-		-6 GROUP LENGTH-		-6 GROUP LENGTH-	
GROUP		GROUP		GROUP	
-6	-5	-6	-5	-6	-5
47.2	94.4	45.9	91.7	44.5	89.1
53.0	105.9	51.5	102.9	50.0	100.0
59.5	118.9	57.8	115.3	56.1	112.3
66.7	133.5	64.8	129.7	63.0	126.0
74.9	149.8	72.6	145.6	70.7	141.4
84.1	168.2	81.7	163.4	79.4	158.7
E	L	E	L	E	L
1	1	1	1	1	1
2	2	2	2	2	2
3	3	3	3	3	3
4	4	4	4	4	4
5	5	5	5	5	5
6	6	6	6	6	6

MAGNIFICATION - .000361		MAGNIFICATION - .000372		MAGNIFICATION - .000383	
-6 GROUP LENGTH-		-6 GROUP LENGTH-		-6 GROUP LENGTH-	
GROUP		GROUP		GROUP	
-6	-5	-6	-5	-6	-5
43.3	86.6	42.0	84.1	40.8	81.7
48.6	97.2	47.2	94.4	45.9	91.7
54.5	109.1	53.0	105.9	51.5	102.9
61.2	122.4	59.5	118.9	57.8	115.3
68.7	137.4	66.7	133.5	64.8	129.7
77.1	154.2	74.9	149.8	72.6	145.6
E	L	E	L	E	L
1	1	1	1	1	1
2	2	2	2	2	2
3	3	3	3	3	3
4	4	4	4	4	4
5	5	5	5	5	5
6	6	6	6	6	6

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER)

MAGNIFICATION - .000394		MAGNIFICATION - .000405		MAGNIFICATION - .000417	
-6	GROUP LENGTH- GROUP	-6	GROUP LENGTH- GROUP	-6	GROUP LENGTH- GROUP
E 1	39.7 79.4 158.7 317.5 635.0 999.9	E 1	39.6 77.1 154.2 308.4 616.9 999.9	E 1	37.5 74.9 149.8 299.7 599.3 999.9
E 2	44.5 89.1 178.2 356.4 712.7 999.9	E 2	43.3 86.6 173.1 346.2 692.5 999.9	E 2	42.0 84.1 168.2 336.4 672.7 999.9
M 3	56.0 100.0 200.0 400.0 800.0 999.9	M 3	48.6 97.2 194.3 388.6 777.2 999.9	M 3	47.2 94.4 188.8 377.6 755.1 999.9
E 4	66.1 112.2 224.5 449.0 898.0 999.9	E 4	54.5 109.0 218.1 436.2 872.4 999.9	E 4	53.0 105.9 211.9 423.8 847.6 999.9
M 5	42.0 124.0 252.0 504.0 999.9 999.9	M 5	61.2 122.4 244.8 489.6 979.2 999.9	M 5	59.5 118.9 237.8 475.7 951.4 999.9
T 6	70.7 141.4 282.8 565.7 999.9 999.9	T 6	68.7 137.4 274.8 549.6 999.9 999.9	T 6	66.7 133.5 267.0 533.9 999.9 999.9

MAGNIFICATION - .000429		MAGNIFICATION - .000442		MAGNIFICATION - .000455	
-6	GROUP LENGTH- GROUP	-6	GROUP LENGTH- GROUP	-6	GROUP LENGTH- GROUP
E 1	36.4 72.8 145.6 291.1 582.3 999.9	E 1	35.4 70.7 141.4 282.8 565.7 999.9	E 1	34.3 68.7 137.4 274.8 549.6 999.9
E 2	40.8 81.7 163.4 326.8 653.6 999.9	E 2	39.7 79.4 158.7 317.5 635.0 999.9	E 2	38.6 77.1 154.2 308.4 616.9 999.9
M 3	45.8 91.7 183.4 366.8 733.6 999.9	M 3	40.5 89.1 178.2 356.4 712.7 999.9	M 3	43.3 86.6 173.1 346.2 692.5 999.9
E 4	51.5 102.9 205.9 411.7 823.4 999.9	E 4	50.0 100.0 200.0 400.0 800.0 999.9	E 4	48.6 97.2 194.3 388.6 777.2 999.9
M 5	37.8 115.5 231.1 462.1 924.3 999.9	M 5	56.1 112.2 224.5 449.0 898.0 999.9	M 5	54.5 109.0 218.1 436.2 872.4 999.9
T 6	44.8 129.7 259.4 518.7 999.9 999.9	T 6	63.0 126.0 252.0 504.0 999.9 999.9	T 6	61.2 122.4 244.8 489.6 979.2 999.9

MAGNIFICATION - .000468		MAGNIFICATION - .000482		MAGNIFICATION - .000496	
-6	GROUP LENGTH- GROUP	-6	GROUP LENGTH- GROUP	-6	GROUP LENGTH- GROUP
E 1	33.4 66.7 133.5 267.0 533.9 999.9	E 1	32.4 64.8 129.7 259.4 518.7 999.9	E 1	31.5 63.0 126.0 252.0 504.0 999.9
E 2	37.5 74.9 149.8 299.7 599.3 999.9	E 2	36.4 72.8 145.6 291.1 582.3 999.9	E 2	35.4 70.7 141.4 282.8 565.7 999.9
M 3	42.0 84.1 168.2 336.4 672.7 999.9	M 3	40.8 81.7 163.4 326.8 653.6 999.9	M 3	39.7 79.4 158.7 317.5 635.0 999.9
E 4	47.2 94.4 188.8 377.6 755.1 999.9	E 4	45.8 91.7 183.4 366.8 733.6 999.9	E 4	44.5 89.1 178.2 356.4 712.7 999.9
M 5	53.0 105.9 211.9 423.8 847.6 999.9	M 5	51.5 102.9 205.9 411.7 823.4 999.9	M 5	50.0 100.0 200.0 400.0 800.0 999.9
T 6	59.5 118.9 237.8 475.7 951.4 999.9	T 6	57.8 115.5 231.1 462.1 924.3 999.9	T 6	56.1 112.2 224.5 449.0 898.0 999.9

MAGNIFICATION - .000511		MAGNIFICATION - .000526		MAGNIFICATION - .000541	
-6	GROUP LENGTH- GROUP	-6	GROUP LENGTH- GROUP	-6	GROUP LENGTH- GROUP
E 1	30.6 61.2 122.4 244.8 489.6 999.9	E 1	29.7 59.5 118.9 237.8 475.7 999.9	E 1	28.9 57.8 115.5 231.1 462.1 999.9
E 2	34.4 68.7 137.4 274.8 549.6 999.9	E 2	33.4 66.7 133.5 267.0 534.0 999.9	E 2	32.4 64.8 129.7 259.4 518.7 999.9
M 3	38.6 77.1 154.2 308.4 616.9 999.9	M 3	37.5 74.9 149.8 299.7 599.3 999.9	M 3	36.4 72.8 145.6 291.1 582.3 999.9
E 4	43.3 86.6 173.1 346.2 692.5 999.9	E 4	42.0 84.1 168.2 336.4 672.7 999.9	E 4	40.8 81.7 163.4 326.8 653.6 999.9
M 5	48.6 97.2 194.3 388.6 777.2 999.9	M 5	47.2 94.4 188.8 377.6 755.1 999.9	M 5	45.9 91.7 183.4 366.8 733.6 999.9
T 6	54.5 109.0 218.1 436.2 872.4 999.9	T 6	53.0 105.9 211.9 423.8 847.6 999.9	T 6	51.5 102.9 205.9 411.7 823.4 999.9

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER)

MAGNIFICATION = .000590		.000573		.000537		.000590			
-6 GROUP LENGTH= .452MM(.0178IN.)		.439MM(.0173IN.)		.427MM(.0168IN.)		.465MM(.0183IN.)			
GROUP		GROUP		GROUP		GROUP			
E	-6	-5	53.0	-4	27.3	-3	28.1	-2	23.7
	53.0		30.6		31.5		28.9		
	53.0		34.3		32.4		32.4		
	53.0		38.4		39.7		40.8		
	53.0		43.3		44.5		45.9		
	53.0		48.4		50.0		51.5		
L 1	-5	L 1	105.9	L 1	109.1	L 1	112.2	L 1	115.3
L 2	-4	L 2	118.9	L 2	122.4	L 2	125.0	L 2	128.7
L 3	-3	L 3	133.5	L 3	137.4	L 3	141.4	L 3	145.4
M 3	-2	M 3	149.8	M 3	154.2	M 3	158.7	M 3	163.4
N 4	-1	N 4	168.5	N 4	173.1	N 4	177.2	N 4	182.4
T 6	-1	T 6	211.9	T 6	216.1	T 6	220.5	T 6	225.0

MAGNIFICATION = .000643		.000625		.000607		.0194IN.)	
-6 GROUP LENGTH-		.479MM(		.465MM(		.0183IN.)	
GROUP		GROUP		GROUP		GROUP	
E	-6	-5	-4	-3	-2	-1	
	24.3	48.6	97.2	194.3	388.6	777.2	
	27.4	54.5	109.1	218.1	436.2	872.4	
	30.6	61.2	122.4	247.8	495.6	991.2	
	34.3	68.7	137.4	274.8	549.6	1099.0	
	38.6	77.1	154.2	304.2	608.4	1216.0	
L 1	-5	-4	-3	-2	-1		
L 2	24.3	48.6	97.2	194.3	388.6	777.2	
L 3	27.4	54.5	109.1	218.1	436.2	872.4	
M 3	30.6	61.2	122.4	247.8	495.6	991.2	
E 4	34.3	68.7	137.4	274.8	549.6	1099.0	
N 5	38.6	77.1	154.2	304.2	608.4	1216.0	
T 6	43.3	86.6	173.1	346.2	692.4	1384.8	

MAGNIFICATION -		.000702		.000682		.000662		.000642	
-6 GROUP LENGTH-		.537MM (.0212IN.)		.522MM (.0206IN.)		.507MM (.0200IN.)		.507MM (.0200IN.)	
GROUP		GROUP		GROUP		GROUP		GROUP	
E	-6	22.3	44.5	69.1	178.2	356.4	712.7	-2	-1
	-5	25.0	50.0	100.0	200.0	400.0	800.0	-1	-1
	-4	28.1	56.1	112.2	224.5	449.0	898.0	-1	-1
	-3	31.5	63.0	126.0	252.0	504.0	999.9	-1	-1
	-2	35.4	70.7	141.4	282.8	565.7	999.9	-1	-1
	-1	39.7	79.4	158.7	317.5	635.0	999.9	-1	-1
L 1	-6	22.9	45.9	91.7	183.4	366.8	733.6	-2	-1
L 2	-5	25.7	51.5	102.9	205.9	411.7	823.5	-1	-1
L 3	-4	28.9	57.8	115.5	231.1	462.2	924.3	-1	-1
M 3	-3	32.4	64.8	129.7	259.4	518.7	999.9	-1	-1
N 4	-2	36.4	72.8	145.6	291.1	582.3	999.9	-1	-1
T 6	-1	40.8	81.7	163.4	326.8	653.6	999.9	-1	-1

MAGNIFICATION = .000765		.000743		.000722					
-6 GROUP LENGTH= .586MM(.0231IN.)		-6 GROUP LENGTH= .569MM(.0224IN.)		-6 GROUP LENGTH= .553MM(.0218IN.)					
GROUP		GROUP		GROUP					
E 1	-6	-5	20.4	-4	21.0	-3	21.9	-2	22.9
	22.9		23.6		24.6		25.7		
	25.7		26.5		27.4		28.4		
	28.4		29.7		30.7		31.7		
	31.7		33.4		34.4		35.4		
	35.4		37.5		38.5		39.5		
L 1	-5	L 1	40.8	L 1	42.0	L 1	43.2	L 1	44.4
L 2	-4	L 2	45.9	L 2	47.2	L 2	48.4	L 2	49.6
M 3	-3	M 3	51.5	M 3	52.8	M 3	54.1	M 3	55.4
N 5	-2	N 5	57.1	N 5	58.4	N 5	59.7	N 5	61.0
T 6	-1	T 6	63.6	T 6	64.9	T 6	66.2	T 6	67.5
			80.7		82.0		83.3		84.6

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER)

MAGNIFICATION - .000787 -6 GROUP LENGTH- GROUP		MAGNIFICATION - .000811 -6 GROUP LENGTH- GROUP		MAGNIFICATION - .000834 -6 GROUP LENGTH- GROUP	
-6	-5	-6	-5	-6	-5
18.7	39.7	19.3	38.4	18.7	37.5
22.3	44.5	21.4	43.3	21.0	42.0
25.0	50.0	20.0	39.2	23.6	47.2
28.1	56.1	22.8	46.0	26.5	53.0
31.5	63.0	25.2	53.7	29.7	59.5
35.4	70.7	28.2	60.7	33.4	66.7
L 1	18.7	L 1	19.3	L 1	18.7
E 2	22.3	E 2	21.4	E 2	21.0
M 3	25.0	M 3	20.0	M 3	23.6
E 4	28.1	E 4	22.8	E 4	26.5
M 5	31.5	M 5	25.2	M 5	29.7
T 6	35.4	T 6	28.2	T 6	33.4

MAGNIFICATION - .000859 -6 GROUP LENGTH- GROUP		MAGNIFICATION - .000884 -6 GROUP LENGTH- GROUP		MAGNIFICATION - .000910 -6 GROUP LENGTH- GROUP	
-6	-5	-6	-5	-6	-5
18.2	38.4	17.7	35.4	17.2	34.3
20.4	40.8	19.8	38.7	19.3	38.6
22.9	45.0	22.3	43.5	21.6	43.3
25.7	51.5	25.0	50.0	24.3	48.6
28.9	57.8	28.1	56.1	27.3	54.5
32.4	64.8	31.5	63.0	30.6	61.2
L 1	18.2	L 1	17.7	L 1	17.2
E 2	20.4	E 2	19.8	E 2	19.3
M 3	22.9	M 3	22.3	M 3	21.6
E 4	25.7	E 4	25.0	E 4	24.3
M 5	28.9	M 5	28.1	M 5	27.3
T 6	32.4	T 6	31.5	T 6	30.6

MAGNIFICATION - .000934 -6 GROUP LENGTH- GROUP		MAGNIFICATION - .000964 -6 GROUP LENGTH- GROUP		MAGNIFICATION - .000992 -6 GROUP LENGTH- GROUP	
-6	-5	-6	-5	-6	-5
16.7	32.4	16.2	32.4	15.7	31.5
18.7	37.5	18.2	36.4	17.7	35.4
21.0	42.0	20.4	40.8	19.8	39.7
23.6	47.2	22.9	45.0	22.3	44.5
26.5	53.0	25.7	51.5	25.0	50.0
29.7	59.5	28.9	57.8	28.1	56.1
L 1	16.7	L 1	16.2	L 1	15.7
E 2	18.7	E 2	18.2	E 2	17.7
M 3	21.0	M 3	20.4	M 3	19.8
E 4	23.6	E 4	22.9	E 4	22.3
M 5	26.5	M 5	25.7	M 5	25.0
T 6	29.7	T 6	28.9	T 6	28.1

MAGNIFICATION - .001021 -6 GROUP LENGTH- GROUP		MAGNIFICATION - .001051 -6 GROUP LENGTH- GROUP		MAGNIFICATION - .001082 -6 GROUP LENGTH- GROUP	
-6	-5	-6	-5	-6	-5
15.3	30.6	14.9	29.7	14.4	28.9
17.2	34.4	16.7	33.4	16.2	32.4
19.3	38.6	18.7	37.5	18.2	36.4
21.6	43.3	21.0	42.0	20.4	40.8
24.3	48.6	23.6	47.2	22.9	45.0
27.3	54.5	26.5	53.0	25.7	51.5
L 1	15.3	L 1	14.9	L 1	14.4
E 2	17.2	E 2	16.7	E 2	16.2
M 3	19.3	M 3	18.7	M 3	18.2
E 4	21.6	E 4	21.0	E 4	20.4
M 5	24.3	M 5	23.6	M 5	22.9
T 6	27.3	T 6	26.5	T 6	25.7

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER)

MAGNIFICATION - .001180		MAGNIFICATION - .001146		MAGNIFICATION - .001114		MAGNIFICATION - .001287		MAGNIFICATION - .001403		MAGNIFICATION - .001530	
-6 GROUP LENGTH- GROUP		-6 GROUP LENGTH- GROUP		-6 GROUP LENGTH- GROUP		-6 GROUP LENGTH- GROUP		-6 GROUP LENGTH- GROUP		-6 GROUP LENGTH- GROUP	
E 1	13.2	E 1	13.6	E 1	10.9	E 1	12.1	E 1	11.1	E 1	10.2
L 1	14.9	L 1	15.3	L 1	15.7	L 1	16.0	L 1	12.6	L 1	11.6
L 2	15.7	L 2	17.2	L 2	17.2	L 2	17.7	L 2	14.0	L 2	11.6
M 3	16.7	M 3	17.2	M 3	17.2	M 3	17.7	M 3	14.0	M 3	11.6
E 4	18.7	E 4	19.3	E 4	19.3	E 4	19.8	E 4	15.7	E 4	12.9
M 5	21.0	M 5	21.6	M 5	21.6	M 5	22.3	M 5	17.7	M 5	14.0
Y 6	23.6	Y 6	24.3	Y 6	24.3	Y 6	25.0	Y 6	19.8	Y 6	16.2
											18.2
MAGNIFICATION - .001250		MAGNIFICATION - .001324		MAGNIFICATION - .001487		MAGNIFICATION - .001530		MAGNIFICATION - .001530		MAGNIFICATION - .001530	
-6 GROUP LENGTH- GROUP		-6 GROUP LENGTH- GROUP		-6 GROUP LENGTH- GROUP		-6 GROUP LENGTH- GROUP		-6 GROUP LENGTH- GROUP		-6 GROUP LENGTH- GROUP	
E 1	13.6	E 1	13.6	E 1	13.6	E 1	13.6	E 1	13.6	E 1	13.6
L 1	14.9	L 1	14.9	L 1	14.9	L 1	14.9	L 1	14.9	L 1	14.9
L 2	15.7	L 2	15.7	L 2	15.7	L 2	15.7	L 2	15.7	L 2	15.7
M 3	16.7	M 3	16.7	M 3	16.7	M 3	16.7	M 3	16.7	M 3	16.7
E 4	18.7	E 4	18.7	E 4	18.7	E 4	18.7	E 4	18.7	E 4	18.7
M 5	21.0	M 5	21.0	M 5	21.0	M 5	21.0	M 5	21.0	M 5	21.0
Y 6	23.6	Y 6	23.6	Y 6	23.6	Y 6	23.6	Y 6	23.6	Y 6	23.6

IMAGE PLANE RESOLUTION LINES PER MILLIMETER

MAGNIFICATION - .001975		MAGNIFICATION - .001621		MAGNIFICATION - .001669	
-6 GROUP LENGTH- GROUP		-6 GROUP LENGTH- GROUP		-6 GROUP LENGTH- GROUP	
E	9.0	E	9.0	E	9.4
L 1	11.1	L 1	10.6	L 1	10.5
L 2	12.5	L 2	12.1	L 2	11.8
M 3	14.0	M 3	13.6	M 3	13.2
E 4	15.7	E 4	15.3	E 4	14.9
M 5	17.7	M 5	17.2	M 5	16.7
Y 6		Y 6		Y 6	

MAGNIFICATION - .001717		MAGNIFICATION - .001768		MAGNIFICATION - .001829	
-6 GROUP LENGTH- GROUP		-6 GROUP LENGTH- GROUP		-6 GROUP LENGTH- GROUP	
E	9.0	E	9.0	E	9.6
L 1	11.1	L 1	10.6	L 1	10.5
L 2	12.5	L 2	12.1	L 2	11.8
M 3	14.0	M 3	13.6	M 3	13.2
E 4	15.7	E 4	15.3	E 4	14.9
M 5	17.7	M 5	17.2	M 5	16.7
Y 6		Y 6		Y 6	

MAGNIFICATION - .001973		MAGNIFICATION - .001920		MAGNIFICATION - .001984	
-6 GROUP LENGTH- GROUP		-6 GROUP LENGTH- GROUP		-6 GROUP LENGTH- GROUP	
E	9.0	E	9.0	E	9.6
L 1	11.1	L 1	10.6	L 1	10.5
L 2	12.5	L 2	12.1	L 2	11.8
M 3	14.0	M 3	13.6	M 3	13.2
E 4	15.7	E 4	15.3	E 4	14.9
M 5	17.7	M 5	17.2	M 5	16.7
Y 6		Y 6		Y 6	

MAGNIFICATION - .002042		MAGNIFICATION - .002102		MAGNIFICATION - .002164	
-6 GROUP LENGTH- GROUP		-6 GROUP LENGTH- GROUP		-6 GROUP LENGTH- GROUP	
E	9.0	E	9.0	E	9.6
L 1	11.1	L 1	10.6	L 1	10.5
L 2	12.5	L 2	12.1	L 2	11.8
M 3	14.0	M 3	13.6	M 3	13.2
E 4	15.7	E 4	15.3	E 4	14.9
M 5	17.7	M 5	17.2	M 5	16.7
Y 6		Y 6		Y 6	

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER)

MAGNIFICATION - .002227
-6 GROUP LENGTH- 1.706MM (.0672IN.)

E 1 1
E 2 2
E 3 3
E 4 4
E 5 5
E 6 6
E 7 7
E 8 8
E 9 9
E 10 10
E 11 11
E 12 12

MAGNIFICATION - .002293
-6 GROUP LENGTH- 1.756MM (.0691IN.)

E 1 1
E 2 2
E 3 3
E 4 4
E 5 5
E 6 6
E 7 7
E 8 8
E 9 9
E 10 10
E 11 11
E 12 12

MAGNIFICATION - .002360
-6 GROUP LENGTH- 1.806MM (.0712IN.)

E 1 1
E 2 2
E 3 3
E 4 4
E 5 5
E 6 6
E 7 7
E 8 8
E 9 9
E 10 10
E 11 11
E 12 12

MAGNIFICATION - .002427
-6 GROUP LENGTH- 1.860MM (.0732IN.)

E 1 1
E 2 2
E 3 3
E 4 4
E 5 5
E 6 6
E 7 7
E 8 8
E 9 9
E 10 10
E 11 11
E 12 12

MAGNIFICATION - .002500
-6 GROUP LENGTH- 1.915MM (.0754IN.)

E 1 1
E 2 2
E 3 3
E 4 4
E 5 5
E 6 6
E 7 7
E 8 8
E 9 9
E 10 10
E 11 11
E 12 12

MAGNIFICATION - .002573
-6 GROUP LENGTH- 1.971MM (.0776IN.)

E 1 1
E 2 2
E 3 3
E 4 4
E 5 5
E 6 6
E 7 7
E 8 8
E 9 9
E 10 10
E 11 11
E 12 12

MAGNIFICATION - .002609
-6 GROUP LENGTH- 2.029MM (.0799IN.)

E 1 1
E 2 2
E 3 3
E 4 4
E 5 5
E 6 6
E 7 7
E 8 8
E 9 9
E 10 10
E 11 11
E 12 12

MAGNIFICATION - .002725
-6 GROUP LENGTH- 2.088MM (.0822IN.)

E 1 1
E 2 2
E 3 3
E 4 4
E 5 5
E 6 6
E 7 7
E 8 8
E 9 9
E 10 10
E 11 11
E 12 12

MAGNIFICATION - .002806
-6 GROUP LENGTH- 2.150MM (.0846IN.)

E 1 1
E 2 2
E 3 3
E 4 4
E 5 5
E 6 6
E 7 7
E 8 8
E 9 9
E 10 10
E 11 11
E 12 12

MAGNIFICATION - .002888
-6 GROUP LENGTH- 2.213MM (.0871IN.)

E 1 1
E 2 2
E 3 3
E 4 4
E 5 5
E 6 6
E 7 7
E 8 8
E 9 9
E 10 10
E 11 11
E 12 12

MAGNIFICATION - .002973
-6 GROUP LENGTH- 2.279MM (.0897IN.)

E 1 1
E 2 2
E 3 3
E 4 4
E 5 5
E 6 6
E 7 7
E 8 8
E 9 9
E 10 10
E 11 11
E 12 12

MAGNIFICATION - .003060
-6 GROUP LENGTH- 2.344MM (.0923IN.)

E 1 1
E 2 2
E 3 3
E 4 4
E 5 5
E 6 6
E 7 7
E 8 8
E 9 9
E 10 10
E 11 11
E 12 12

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER)

MAGNIFICATION - .003150		MAGNIFICATION - .003242		MAGNIFICATION - .003337	
-6 GROUP LENGTH- 2.613MM (.099IN.)		-6 GROUP LENGTH- 2.483MM (.0978IN.)		-6 GROUP LENGTH- 2.556MM (.1006IN.)	
GROUP		GROUP		GROUP	
-6	-5	-6	-5	-6	-5
5.0	9.9	4.8	9.6	4.7	9.4
5.6	11.1	5.4	10.8	5.3	10.5
6.2	12.5	6.1	12.1	5.9	11.8
6.8	14.0	6.8	13.6	6.6	13.2
7.4	15.7	7.7	15.3	7.4	14.9
8.0	17.7	8.6	17.2	8.3	16.7
E		E		E	
L 1		L 1		L 1	
E 2		E 2		E 2	
M 3		M 3		M 3	
E 4		E 4		E 4	
M 5		M 5		M 5	
T 6		T 6		T 6	

MAGNIFICATION - .003425		MAGNIFICATION - .003536		MAGNIFICATION - .003639	
-6 GROUP LENGTH- 2.671MM (.1034IN.)		-6 GROUP LENGTH- 2.708MM (.1066IN.)		-6 GROUP LENGTH- 2.768MM (.1097IN.)	
GROUP		GROUP		GROUP	
-6	-5	-6	-5	-6	-5
4.5	9.1	4.4	8.8	4.3	8.6
5.1	10.2	5.0	9.9	4.8	9.6
5.7	11.5	5.6	11.1	5.4	10.8
6.4	12.9	6.2	12.5	6.1	12.1
7.2	14.4	7.0	14.0	6.8	13.6
8.1	16.2	7.9	15.7	7.7	15.3
E		E		E	
L 1		L 1		L 1	
E 2		E 2		E 2	
M 3		M 3		M 3	
E 4		E 4		E 4	
M 5		M 5		M 5	
T 6		T 6		T 6	

MAGNIFICATION - .003740		MAGNIFICATION - .003850		MAGNIFICATION - .003969	
-6 GROUP LENGTH- 2.849MM (.1137IN.)		-6 GROUP LENGTH- 2.953MM (.1163IN.)		-6 GROUP LENGTH- 3.040MM (.1197IN.)	
GROUP		GROUP		GROUP	
-6	-5	-6	-5	-6	-5
4.2	8.3	4.1	8.1	3.9	7.9
4.7	9.6	4.5	9.1	4.4	8.8
5.3	10.5	5.1	10.2	5.0	9.9
5.9	11.8	5.7	11.5	5.6	11.1
6.6	13.2	6.4	12.9	6.2	12.5
7.4	14.9	7.2	14.4	7.0	14.0
E		E		E	
L 1		L 1		L 1	
E 2		E 2		E 2	
M 3		M 3		M 3	
E 4		E 4		E 4	
M 5		M 5		M 5	
T 6		T 6		T 6	

MAGNIFICATION - .004085		MAGNIFICATION - .004204		MAGNIFICATION - .004320	
-6 GROUP LENGTH- 3.129MM (.1232IN.)		-6 GROUP LENGTH- 3.221MM (.1268IN.)		-6 GROUP LENGTH- 3.315MM (.1305IN.)	
GROUP		GROUP		GROUP	
-6	-5	-6	-5	-6	-5
3.8	7.7	3.7	7.4	3.6	7.2
4.3	8.6	4.2	8.3	4.1	8.1
4.8	9.6	4.7	9.4	4.5	9.1
5.4	10.6	5.3	10.5	5.1	10.2
6.1	12.1	6.0	11.8	5.7	11.5
6.8	13.6	6.6	13.2	6.4	12.9
E		E		E	
L 1		L 1		L 1	
E 2		E 2		E 2	
M 3		M 3		M 3	
E 4		E 4		E 4	
M 5		M 5		M 5	
T 6		T 6		T 6	

MAGNIFICATION - .004454 -6 GROUP LENGTH- 3.412MM (.1343IN.)										MAGNIFICATION - .004585 -6 GROUP LENGTH- 3.512MM (.1383IN.)										MAGNIFICATION - .004719 -6 GROUP LENGTH- 3.615MM (.1423IN.)									
GROUP										GROUP										GROUP									
E	-6	-5	-4	-3	-2	-1	E	-6	-5	-4	-3	-2	-1	E	-6	-5	-4	-3	-2	-1									
L 1	3.5	7.0	14.0	28.1	56.1	112.2	L 1	3.4	6.8	13.6	27.3	54.5	109.1	L 1	3.3	6.6	13.2	26.5	53.0	105.9									
L 2	3.9	7.9	15.7	31.5	63.0	126.0	L 2	3.6	7.7	15.3	30.6	61.2	122.4	L 2	3.7	7.4	14.9	29.7	59.5	118.9									
M 3	4.4	8.8	17.7	35.4	70.7	141.4	M 3	4.3	8.6	17.2	34.3	68.7	137.4	M 3	4.2	8.3	16.7	33.4	66.7	133.5									
E 4	5.0	9.9	19.8	39.7	79.4	158.7	E 4	4.8	9.6	19.3	38.6	77.1	154.2	E 4	4.7	9.4	18.7	37.5	74.9	149.8									
M 5	5.6	11.1	22.3	44.5	89.1	178.2	M 5	5.4	10.8	21.6	43.3	86.6	173.1	M 5	5.3	10.5	21.0	42.0	84.1	168.2									
T 6	6.3	12.5	25.0	50.0	100.0	200.0	T 6	6.1	12.1	24.3	48.6	97.2	194.3	T 6	5.9	11.8	23.6	47.2	94.4	188.8									

MAGNIFICATION - .004858 -6 GROUP LENGTH- 3.721MM (.1465IN.)										MAGNIFICATION - .005000 -6 GROUP LENGTH- 3.830MM (.1508IN.)										MAGNIFICATION - .005147 -6 GROUP LENGTH- 3.942MM (.1552IN.)									
GROUP										GROUP										GROUP									
E	-6	-5	-4	-3	-2	-1	E	-6	-5	-4	-3	-2	-1	E	-6	-5	-4	-3	-2	-1									
L 1	3.2	6.4	12.9	25.7	51.5	102.9	L 1	3.1	6.3	12.5	25.0	50.0	100.0	L 1	3.0	6.1	12.1	24.3	48.6	97.2									
L 2	3.6	7.2	14.4	28.9	57.8	115.5	L 2	3.5	7.0	14.0	28.1	56.1	112.3	L 2	3.4	6.8	13.6	27.3	54.5	109.1									
M 3	4.1	8.1	16.2	32.4	64.8	129.7	M 3	3.9	7.9	15.7	31.5	63.0	126.0	M 3	3.8	7.7	15.3	30.6	61.2	122.4									
E 4	4.5	9.1	18.2	36.4	72.8	145.6	E 4	4.4	8.8	17.7	35.4	70.7	141.4	E 4	4.3	8.6	17.2	34.3	68.7	137.4									
M 5	5.1	10.2	20.4	40.8	81.7	163.4	M 5	5.0	9.9	19.8	39.7	79.4	158.7	M 5	4.8	9.6	19.3	38.6	77.1	154.2									
T 6	5.7	11.5	22.9	45.9	91.7	183.4	T 6	5.6	11.1	22.3	44.5	89.1	178.2	T 6	5.4	10.8	21.6	43.3	86.6	173.1									

MAGNIFICATION - .005297 -6 GROUP LENGTH- 4.058MM (.159IN.)										MAGNIFICATION - .005453 -6 GROUP LENGTH- 4.177MM (.1644IN.)										MAGNIFICATION - .005612 -6 GROUP LENGTH- 4.299MM (.1693IN.)									
GROUP										GROUP										GROUP									
E	-6	-5	-4	-3	-2	-1	E	-6	-5	-4	-3	-2	-1	E	-6	-5	-4	-3	-2	-1									
L 1	2.9	5.9	11.8	23.6	47.2	94.4	L 1	2.9	5.7	11.5	22.9	45.9	91.7	L 1	2.8	5.6	11.1	22.3	44.5	89.1									
L 2	3.3	6.6	13.2	26.5	53.0	106.0	L 2	3.2	6.4	12.9	25.7	51.5	102.9	L 2	3.1	6.3	12.5	25.0	50.0	100.0									
M 3	3.7	7.4	14.7	29.7	59.5	118.9	M 3	3.6	7.2	14.4	28.9	57.8	115.5	M 3	3.5	7.0	14.0	28.1	56.1	112.3									
E 4	4.2	8.3	16.7	33.4	66.7	133.5	E 4	4.1	8.1	16.2	32.4	64.8	129.7	E 4	3.9	7.9	15.7	31.5	63.0	126.0									
M 5	4.7	9.4	18.7	37.5	74.9	149.8	M 5	4.5	9.1	18.2																			

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER)

MAGNIFICATION - .006306		MAGNIFICATION - .006484		MAGNIFICATION - .006674	
-6 GROUP LENGTH- .190IN.)		-6 GROUP LENGTH- .1955IN.)		-6 GROUP LENGTH- 5.112MM (.2013IN.)	
GROUP		GROUP		GROUP	
-6	-5	-6	-5	-6	-5
2.5	5.0	2.4	4.8	2.3	4.7
2.8	5.6	2.7	5.4	2.6	5.3
3.1	6.2	3.0	6.1	2.9	5.9
3.5	7.0	3.4	6.8	3.3	6.6
3.9	7.9	3.8	7.7	3.7	7.4
4.4	8.8	4.3	8.6	4.2	8.3
17.7	35.4	17.2	34.3	16.7	33.4
70.7	141.4	68.7	137.4	66.7	133.5
L 1	-1	L 1	-2	L 1	-1
L 2	-2	L 2	-3	L 2	-2
M 3	-3	M 3	-4	M 3	-3
E 4	-4	E 4	-5	E 4	-4
N 5	-5	N 5	-6	N 5	-5
T 6	-6	T 6	-7	T 6	-6

MAGNIFICATION - .006870		MAGNIFICATION - .007071		MAGNIFICATION - .007278	
-6 GROUP LENGTH- 5.282MM (.2072IN.)		-6 GROUP LENGTH- 5.416MM (.2132IN.)		-6 GROUP LENGTH- 5.575MM (.2195IN.)	
GROUP		GROUP		GROUP	
-6	-5	-6	-5	-6	-5
2.3	4.5	2.2	4.4	2.1	4.3
2.6	5.1	2.5	5.0	2.4	4.8
2.9	5.7	2.8	5.6	2.7	5.4
3.2	6.4	3.1	6.2	3.0	6.1
3.6	7.2	3.5	7.0	3.4	6.8
4.1	8.1	3.9	7.9	3.8	7.7
16.2	32.4	15.7	31.5	15.3	30.6
64.8	129.6	63.0	126.0	61.2	122.4
L 1	-1	L 1	-2	L 1	-1
L 2	-2	L 2	-3	L 2	-2
M 3	-3	M 3	-4	M 3	-3
E 4	-4	E 4	-5	E 4	-4
N 5	-5	N 5	-6	N 5	-5
T 6	-6	T 6	-7	T 6	-6

MAGNIFICATION - .007492		MAGNIFICATION - .007711		MAGNIFICATION - .007937	
-6 GROUP LENGTH- 5.739MM (.2254IN.)		-6 GROUP LENGTH- 5.907MM (.2325IN.)		-6 GROUP LENGTH- 6.080MM (.2394IN.)	
GROUP		GROUP		GROUP	
-6	-5	-6	-5	-6	-5
2.1	4.2	2.0	4.1	2.0	3.9
2.3	4.7	2.2	4.5	2.2	4.4
2.6	5.3	2.5	5.1	2.5	5.0
2.9	5.9	2.8	5.7	2.8	5.6
3.3	6.6	3.2	6.4	3.1	6.2
3.7	7.4	3.6	7.2	3.5	7.0
14.4	28.8	14.2	28.4	14.0	28.1
59.5	119.0	57.6	115.5	56.1	112.2
L 1	-1	L 1	-2	L 1	-1
L 2	-2	L 2	-3	L 2	-2
M 3	-3	M 3	-4	M 3	-3
E 4	-4	E 4	-5	E 4	-4
N 5	-5	N 5	-6	N 5	-5
T 6	-6	T 6	-7	T 6	-6

MAGNIFICATION - .008170		MAGNIFICATION - .008409		MAGNIFICATION - .008655	
-6 GROUP LENGTH- 6.258MM (.2464IN.)		-6 GROUP LENGTH- 6.441MM (.2536IN.)		-6 GROUP LENGTH- 6.630MM (.2610IN.)	
GROUP		GROUP		GROUP	
-6	-5	-6	-5	-6	-5
1.4	2.8	1.3	2.7	1.2	2.4
1.6	3.2	1.5	3.0	1.4	2.8
1.8	3.6	1.7	3.4	1.6	3.2
2.0	4.0	1.9	3.8	1.8	3.6
2.2	4.4	2.1	4.2	2.0	4.0
2.4	4.8	2.3	4.6	2.2	4.4
2.6	5.2	2.5	5.0	2.4	4.8
2.8	5.6	2.7	5.4	2.6	5.2
3.0	6.0	2.9	5.8	2.8	5.6
3.2	6.4	3.1	6.2	3.0	6.0
12.1	24.2	11.8	23.6	11.5	22.9
49.7	99.4	47.2	94.4	45.9	91.7
L 1	-1	L 1	-2	L 1	-1
L 2	-2	L 2	-3	L 2	-2
M 3	-3	M 3	-4	M 3	-3
E 4	-4	E 4	-5	E 4	-4
N 5	-5	N 5	-6	N 5	-5
T 6	-6	T 6	-7	T 6	-6

IMAGE PLANE RESOLUTION LINES PER MILLIMETER

MAGNIFICATION - .009439		MAGNIFICATION - .009170	
-6 GROUP LENGTH- 7.230MM (.286IN.)		-6 GROUP LENGTH- 7.024MM (.276IN.)	
GROUP		GROUP	
-6	-5	-6	-5
-5	1.7	-5	1.7
-4	1.9	-4	1.9
-3	2.1	-3	2.1
-2	2.3	-2	2.3
-1	2.6	-1	2.6
0	2.9	0	2.9
1	3.3	1	3.3
2	3.7	2	3.7
3	4.2	3	4.2
4	4.7	4	4.7
5	5.3	5	5.3
6	5.9	6	5.9
7	6.6	7	6.6
8	7.4	8	7.4
9	8.2	9	8.2
10	9.0	10	9.0
11	9.8	11	9.8
12	10.6	12	10.6
13	11.4	13	11.4
14	12.2	14	12.2
15	13.0	15	13.0
16	13.8	16	13.8
17	14.6	17	14.6
18	15.4	18	15.4
19	16.2	19	16.2
20	17.0	20	17.0
21	17.8	21	17.8
22	18.6	22	18.6
23	19.4	23	19.4
24	20.2	24	20.2
25	21.0	25	21.0
26	21.8	26	21.8
27	22.6	27	22.6
28	23.4	28	23.4
29	24.2	29	24.2
30	25.0	30	25.0
31	25.8	31	25.8
32	26.6	32	26.6
33	27.4	33	27.4
34	28.2	34	28.2
35	29.0	35	29.0
36	29.8	36	29.8
37	30.6	37	30.6
38	31.4	38	31.4
39	32.2	39	32.2
40	33.0	40	33.0
41	33.8	41	33.8
42	34.6	42	34.6
43	35.4	43	35.4
44	36.2	44	36.2
45	37.0	45	37.0
46	37.8	46	37.8
47	38.6	47	38.6
48	39.4	48	39.4
49	40.2	49	40.2
50	41.0	50	41.0
51	41.8	51	41.8
52	42.6	52	42.6
53	43.4	53	43.4
54	44.2	54	44.2
55	45.0	55	45.0
56	45.8	56	45.8
57	46.6	57	46.6
58	47.4	58	47.4
59	48.2	59	48.2
60	49.0	60	49.0
61	49.8	61	49.8
62	50.6	62	50.6
63	51.4	63	51.4
64	52.2	64	52.2
65	53.0	65	53.0
66	53.8	66	53.8
67	54.6	67	54.6
68	55.4	68	55.4
69	56.2	69	56.2
70	57.0	70	57.0
71	57.8	71	57.8
72	58.6	72	58.6
73	59.4	73	59.4
74	60.2	74	60.2
75	61.0	75	61.0
76	61.8	76	61.8
77	62.6	77	62.6
78	63.4	78	63.4
79	64.2	79	64.2
80	65.0	80	65.0
81	65.8	81	65.8
82	66.6	82	66.6
83	67.4	83	67.4
84	68.2	84	68.2
85	69.0	85	69.0
86	69.8	86	69.8
87	70.6	87	70.6
88	71.4	88	71.4
89	72.2	89	72.2
90	73.0	90	73.0
91	73.8	91	73.8
92	74.6	92	74.6
93	75.4	93	75.4
94	76.2	94	76.2
95	77.0	95	77.0
96	77.8	96	77.8
97	78.6	97	78.6
98	79.4	98	79.4
99	80.2	99	80.2
100	81.0	100	81.0

MAGNIFICATION - .010293		MAGNIFICATION - .010000	
-6 GROUP LENGTH- 7.884MM (.3104IN.)		-6 GROUP LENGTH- 7.660MM (.3016IN.)	
GROUP		GROUP	
-6	-5	-6	-5
-5	1.5	-5	1.5
-4	1.7	-4	1.7
-3	1.9	-3	1.9
-2	2.1	-2	2.1
-1	2.3	-1	2.3
0	2.5	0	2.5
1	2.7	1	2.7
2	3.0	2	3.0
3	3.4	3	3.4
4	3.8	4	3.8
5	4.2	5	4.2
6	4.6	6	4.6
7	5.0	7	5.0
8	5.4	8	5.4
9	5.8	9	5.8
10	6.2	10	6.2
11	6.6	11	6.6
12	7.0	12	7.0
13	7.4	13	7.4
14	7.8	14	7.8
15	8.2	15	8.2
16	8.6	16	8.6
17	9.0	17	9.0
18	9.4	18	9.4
19	9.8	19	9.8
20	10.2	20	10.2
21	10.6	21	10.6
22	11.0	22	11.0
23	11.4	23	11.4
24	11.8	24	11.8
25	12.2	25	12.2
26	12.6	26	12.6
27	13.0	27	13.0
28	13.4	28	13.4
29	13.8	29	13.8
30	14.2	30	14.2
31	14.6	31	14.6
32	15.0	32	15.0
33	15.4	33	15.4
34	15.8	34	15.8
35	16.2	35	16.2
36	16.6	36	16.6
37	17.0	37	17.0
38	17.4	38	17.4
39	17.8	39	17.8
40	18.2	40	18.2
41	18.6	41	18.6
42	19.0	42	19.0
43	19.4	43	19.4
44	19.8	44	19.8
45	20.2	45	20.2
46	20.6	46	20.6
47	21.0	47	21.0
48	21.4	48	21.4
49	21.8	49	21.8
50	22.2	50	22.2
51	22.6	51	22.6
52	23.0	52	23.0
53	23.4	53	23.4
54	23.8	54	23.8
55	24.2	55	24.2
56	24.6	56	24.6
57	25.0	57	25.0
58	25.4	58	25.4
59	25.8	59	25.8
60	26.2	60	26.2
61	26.6	61	26.6
62	27.0	62	27.0
63	27.4	63	27.4
64	27.8	64	27.8
65	28.2	65	28.2
66	28.6	66	28.6
67	29.0	67	29.0
68	29.4	68	29.4
69	29.8	69	29.8
70	30.2	70	30.2
71	30.6	71	30.6
72	31.0	72	31.0
73	31.4	73	31.4
74	31.8	74	31.8
75	32.2	75	32.2
76	32.6	76	32.6
77	33.0	77	33.0
78	33.4	78	33.4
79	33.8	79	33.8
80	34.2	80	34.2
81	34.6	81	34.6
82	35.0	82	35.0
83	35.4	83	35.4
84	35.8	84	35.8
85	36.2	85	36.2
86	36.6	86	36.6
87	37.0	87	37.0
88	37.4	88	37.4
89	37.8	89	37.8
90	38.2	90	38.2
91	38.6	91	38.6
92	39.0	92	39.0
93	39.4	93	39.4
94	39.8	94	39.8
95	40.2	95	40.2
96	40.6	96	40.6
97	41.0	97	41.0
98	41.4	98	41.4
99	41.8	99	41.8
100	42.2	100	42.2

MAGNIFICATION - .011225		MAGNIFICATION - .010905	
-6 GROUP LENGTH- 8.596MM (.3385IN.)		-6 GROUP LENGTH- 8.353MM (.3289IN.)	
GROUP		GROUP	
-6	-5	-6	-5
-5	1.4	-5	1.4
-4	1.6	-4	1.6
-3	1.8	-3	1.8
-2	2.0	-2	2.0
-1	2.2	-1	2.2
0	2.4	0	2.4
1	2.6	1	2.6
2	2.8	2	2.8
3	3.1	3	3.1
4	3.5	4	3.5
5	3.9	5	3.9
6	4.3	6	4.3
7	4.7	7	4.7
8	5.1	8	5.1
9	5.5	9	5.5
10	5.9	10	5.9
11	6.3	11	6.3
12	6.7	12	6.7
13	7.1	13	7.1
14	7.5	14	7.5
15	7.9	15	7.9
16	8.3	16	8.3
17	8.7	17	8.7
18	9.1	18	9.1
19	9.5	19	9.5
20	9.9	20	9.9
21	10.3	21	10.3
22	10.7	22	10.7
23	11.1	23	11.1
24	11.5	24	11.5
25	11.9	25	11.9
26	12.3	26	12.3
27	12.7	27	12.7
28	13.1	28	13.1
29	13.5	29	13.5
30	13.9	30	13.9
31	14.3	31	14.3
32	14.7	32	14.7
33	15.1	33	15.1
34	15.5	34	15.5
35	15.9	35	15.9
36	16.3	36	16.3
37	16.7	37	16.7
38	17.1	38	17.1
39	17.5	39	17.5
40	17.9	40	17.9
41	18.3	41	18.3
42	18.7	42	18.7
43	19.1	43	19.1
44	19.5	44	19.5
45	19.9	45	19.9
46	20.3	46	20.3
47	20.7	47	20.7
48	21.1	48	21.1
49	21.5	49	21.5
50	21.9	50	21.9
51	22.3	51	22.3
52	22.7	52	22.7
53	23.1	53	23.1
54	23.5	54	23.5
55	23.9	55	23.9
56	24.3	56	24.3
57	24.7	57	24.7
58	25.1	58	25.1
59	25.5	59	25.5
60	25.9	60	25.9
61	26.3	61	26.3
62	26.7	62	26.7
63	27.1	63	27.1
64	27.5	64	27.5
65	27.9	65	27.9
66	28.3	66	28.3
67	28.7	67	28.7
68	29.1	68	29.1
69	29.5	69	29.5
70	29.9	70	29.9
71	30.3	71	30.3
72	30.7	72	30.7
73	31.1	73	31.1
74	31.5	74	31.5
75	31.9	75	31.9
76	32.3	76	32.3
77	32.7	77	32.7
78	33.1	78	33.1
79	33.5	79	33.5
80	33.9	80	33.9
81	34.3	81	34.3
82	34.7	82	34.7
83	35.1	83	35.1
84	35.5	84	35.5
85	35.9	85	35.9
86	36.3	86	36.3
87	36.7	87	36.7
88	37.1	88	37.1
89	37.5	89	37.5
90	37.9	90	37.9
91	38.3	91	38.3
92	38.7	92	38.7

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER)

MAGNIFICATION		.012599		.012968		.013348	
		-A GROUP LENGTH-10.524MM (.414IN.)		-A GROUP LENGTH-9.934MM (.391IN.)		-6 GROUP LENGTH-10.225MM (.4026IN.)	
	GROUP						
E	-5	-5	-2	-3	-1	-6	-5
L 1	1.2	2.3	4.0	1.2	2.4	4.8	1.2
E 2	1.6	2.9	5.0	1.4	2.7	5.4	1.3
M 3	1.6	3.1	6.1	1.5	3.0	6.1	1.5
E 4	1.4	3.5	7.0	1.7	3.4	6.8	1.7
M 5	2.0	3.9	7.7	1.9	3.8	7.7	1.9
T 6	2.2	4.0	8.1	2.1	4.3	8.6	2.1

E 1
L 1
E 2
M 3
E 4
M 5
T 6

MAGNIFICATION		.013760		.014142		.014557	
		-A GROUP LENGTH-10.524MM (.414IN.)		-A GROUP LENGTH-10.833MM (.4265IN.)		-6 GROUP LENGTH-11.150MM (.4390IN.)	
	GROUP						
E	-5	-5	-2	-3	-1	-6	-5
L 1	1.1	2.3	4.0	1.1	2.2	4.4	1.1
E 2	1.3	2.6	5.1	1.2	2.5	5.0	1.2
M 3	1.4	2.9	5.7	1.4	2.8	5.6	1.4
E 4	1.6	3.2	6.0	1.6	3.1	6.3	1.5
M 5	1.4	3.6	7.0	1.8	3.5	7.0	1.7
T 6	2.0	4.1	8.1	2.0	3.9	7.9	1.9

E 1
L 1
E 2
M 3
E 4
M 5
T 6

MAGNIFICATION		.014773		.015422		.015874	
		-A GROUP LENGTH-11.477MM (.4514IN.)		-A GROUP LENGTH-11.813MM (.4651IN.)		-6 GROUP LENGTH-12.159MM (.4787IN.)	
	GROUP						
E	-5	-5	-2	-3	-1	-6	-5
L 1	1.0	2.1	4.0	1.0	2.0	4.1	1.0
E 2	1.2	2.3	4.7	1.1	2.3	4.5	1.1
M 3	1.3	2.6	5.4	1.3	2.6	5.1	1.2
E 4	1.5	2.9	5.9	1.4	2.9	5.7	1.4
M 5	1.7	3.3	6.7	1.6	3.2	6.4	1.6
T 6	1.9	3.7	7.6	1.8	3.6	7.2	1.8

E 1
L 1
E 2
M 3
E 4
M 5
T 6

MAGNIFICATION		.016339		.016818		.017311	
		-6 GROUP LENGTH-12.516MM (.4927IN.)		-A GROUP LENGTH-12.883MM (.5072IN.)		-6 GROUP LENGTH-13.260MM (.5220IN.)	
	GROUP						
E	-5	-5	-2	-3	-1	-6	-5
L 1	1.0	1.9	3.7	1.0	1.9	3.7	1.0
E 2	1.1	2.1	4.0	1.0	2.0	4.0	1.0
M 3	1.2	2.3	4.7	1.2	2.3	4.7	1.1
E 4	1.4	2.6	5.4	1.3	2.6	5.1	1.3
M 5	1.5	2.9	5.9	1.5	2.9	5.7	1.4
T 6	1.7	3.3	6.7	1.7	3.3	6.4	1.6

E 1
L 1
E 2
M 3
E 4
M 5
T 6

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER)

MAGNIFICATION - .017x18		-6 GROUP LENGTH-13.64MM (.537IN.)	
GROUP		GROUP	
-6	-4	-3	-2
1.0	1.0	1.0	1.0
1.1	1.1	1.1	1.1
1.2	1.2	1.2	1.2
1.3	1.3	1.3	1.3
1.4	1.4	1.4	1.4
1.5	1.5	1.5	1.5

MAGNIFICATION - .018x30		-6 GROUP LENGTH-14.04MM (.553IN.)	
GROUP		GROUP	
-6	-4	-3	-2
1.0	1.0	1.0	1.0
1.1	1.1	1.1	1.1
1.2	1.2	1.2	1.2
1.3	1.3	1.3	1.3
1.4	1.4	1.4	1.4
1.5	1.5	1.5	1.5

MAGNIFICATION - .018x77		-6 GROUP LENGTH-14.46MM (.5693IN.)	
GROUP		GROUP	
-6	-4	-3	-2
1.0	1.0	1.0	1.0
1.1	1.1	1.1	1.1
1.2	1.2	1.2	1.2
1.3	1.3	1.3	1.3
1.4	1.4	1.4	1.4
1.5	1.5	1.5	1.5

MAGNIFICATION - .019x31		-6 GROUP LENGTH-14.84MM (.584IN.)	
GROUP		GROUP	
-6	-4	-3	-2
1.0	1.0	1.0	1.0
1.1	1.1	1.1	1.1
1.2	1.2	1.2	1.2
1.3	1.3	1.3	1.3
1.4	1.4	1.4	1.4
1.5	1.5	1.5	1.5

MAGNIFICATION - .020x30		-6 GROUP LENGTH-15.32MM (.6031IN.)	
GROUP		GROUP	
-6	-4	-3	-2
1.0	1.0	1.0	1.0
1.1	1.1	1.1	1.1
1.2	1.2	1.2	1.2
1.3	1.3	1.3	1.3
1.4	1.4	1.4	1.4
1.5	1.5	1.5	1.5

MAGNIFICATION - .020x86		-6 GROUP LENGTH-15.76MM (.6208IN.)	
GROUP		GROUP	
-6	-4	-3	-2
1.0	1.0	1.0	1.0
1.1	1.1	1.1	1.1
1.2	1.2	1.2	1.2
1.3	1.3	1.3	1.3
1.4	1.4	1.4	1.4
1.5	1.5	1.5	1.5

MAGNIFICATION - .021x19		-6 GROUP LENGTH-16.21MM (.634IN.)	
GROUP		GROUP	
-6	-4	-3	-2
1.0	1.0	1.0	1.0
1.1	1.1	1.1	1.1
1.2	1.2	1.2	1.2
1.3	1.3	1.3	1.3
1.4	1.4	1.4	1.4
1.5	1.5	1.5	1.5

MAGNIFICATION - .021x18		-6 GROUP LENGTH-16.70MM (.6577IN.)	
GROUP		GROUP	
-6	-4	-3	-2
1.0	1.0	1.0	1.0
1.1	1.1	1.1	1.1
1.2	1.2	1.2	1.2
1.3	1.3	1.3	1.3
1.4	1.4	1.4	1.4
1.5	1.5	1.5	1.5

MAGNIFICATION - .022x49		-6 GROUP LENGTH-17.19MM (.6770IN.)	
GROUP		GROUP	
-6	-4	-3	-2
1.0	1.0	1.0	1.0
1.1	1.1	1.1	1.1
1.2	1.2	1.2	1.2
1.3	1.3	1.3	1.3
1.4	1.4	1.4	1.4
1.5	1.5	1.5	1.5

MAGNIFICATION - .023x17		-6 GROUP LENGTH-17.70MM (.694IN.)	
GROUP		GROUP	
-6	-4	-3	-2
1.0	1.0	1.0	1.0
1.1	1.1	1.1	1.1
1.2	1.2	1.2	1.2
1.3	1.3	1.3	1.3
1.4	1.4	1.4	1.4
1.5	1.5	1.5	1.5

MAGNIFICATION - .023x74		-6 GROUP LENGTH-18.21MM (.7173IN.)	
GROUP		GROUP	
-6	-4	-3	-2
1.0	1.0	1.0	1.0
1.1	1.1	1.1	1.1
1.2	1.2	1.2	1.2
1.3	1.3	1.3	1.3
1.4	1.4	1.4	1.4
1.5	1.5	1.5	1.5

MAGNIFICATION - .024x81		-6 GROUP LENGTH-18.75MM (.7383IN.)	
GROUP		GROUP	
-6	-4	-3	-2
1.0	1.0	1.0	1.0
1.1	1.1	1.1	1.1
1.2	1.2	1.2	1.2
1.3	1.3	1.3	1.3
1.4	1.4	1.4	1.4
1.5	1.5	1.5	1.5

IMAGE PLANE RESOLUTION (LINES PER MILLIMETER)

MAGNIFICATION - .025198		MAGNIFICATION - .025937		MAGNIFICATION - .026697	
-A GROUP LENGTH-19.12MM (.759IN.)		-A GROUP LENGTH-19.86MM (.782IN.)		-A GROUP LENGTH-20.45MM (.803IN.)	
GROUP		GROUP		GROUP	
-5	-1	-5	-1	-5	-1
-4	2.0	-4	2.0	-4	2.0
-3	3.0	-3	3.0	-3	3.0
-2	4.0	-2	4.0	-2	4.0
-1	5.0	-1	5.0	-1	5.0
0	6.0	0	6.0	0	6.0
1	7.0	1	7.0	1	7.0
2	8.0	2	8.0	2	8.0
3	9.0	3	9.0	3	9.0
4	10.0	4	10.0	4	10.0
5	11.0	5	11.0	5	11.0
6	12.0	6	12.0	6	12.0
7	13.0	7	13.0	7	13.0
8	14.0	8	14.0	8	14.0
9	15.0	9	15.0	9	15.0
10	16.0	10	16.0	10	16.0
11	17.0	11	17.0	11	17.0
12	18.0	12	18.0	12	18.0
13	19.0	13	19.0	13	19.0
14	20.0	14	20.0	14	20.0
15	21.0	15	21.0	15	21.0
16	22.0	16	22.0	16	22.0
17	23.0	17	23.0	17	23.0
18	24.0	18	24.0	18	24.0
19	25.0	19	25.0	19	25.0
20	26.0	20	26.0	20	26.0
21	27.0	21	27.0	21	27.0
22	28.0	22	28.0	22	28.0
23	29.0	23	29.0	23	29.0
24	30.0	24	30.0	24	30.0
25	31.0	25	31.0	25	31.0
26	32.0	26	32.0	26	32.0
27	33.0	27	33.0	27	33.0
28	34.0	28	34.0	28	34.0
29	35.0	29	35.0	29	35.0
30	36.0	30	36.0	30	36.0

MAGNIFICATION - .027479		MAGNIFICATION - .028284		MAGNIFICATION - .029113	
-A GROUP LENGTH-21.79MM (.862IN.)		-A GROUP LENGTH-21.66MM (.853IN.)		-A GROUP LENGTH-22.30MM (.878IN.)	
GROUP		GROUP		GROUP	
-5	-1	-5	-1	-5	-1
-4	2.0	-4	2.0	-4	2.0
-3	3.0	-3	3.0	-3	3.0
-2	4.0	-2	4.0	-2	4.0
-1	5.0	-1	5.0	-1	5.0
0	6.0	0	6.0	0	6.0
1	7.0	1	7.0	1	7.0
2	8.0	2	8.0	2	8.0
3	9.0	3	9.0	3	9.0
4	10.0	4	10.0	4	10.0
5	11.0	5	11.0	5	11.0
6	12.0	6	12.0	6	12.0
7	13.0	7	13.0	7	13.0
8	14.0	8	14.0	8	14.0
9	15.0	9	15.0	9	15.0
10	16.0	10	16.0	10	16.0
11	17.0	11	17.0	11	17.0
12	18.0	12	18.0	12	18.0
13	19.0	13	19.0	13	19.0
14	20.0	14	20.0	14	20.0
15	21.0	15	21.0	15	21.0
16	22.0	16	22.0	16	22.0
17	23.0	17	23.0	17	23.0
18	24.0	18	24.0	18	24.0
19	25.0	19	25.0	19	25.0
20	26.0	20	26.0	20	26.0
21	27.0	21	27.0	21	27.0
22	28.0	22	28.0	22	28.0
23	29.0	23	29.0	23	29.0
24	30.0	24	30.0	24	30.0
25	31.0	25	31.0	25	31.0
26	32.0	26	32.0	26	32.0
27	33.0	27	33.0	27	33.0
28	34.0	28	34.0	28	34.0
29	35.0	29	35.0	29	35.0
30	36.0	30	36.0	30	36.0

MAGNIFICATION - .029440		MAGNIFICATION - .030844		MAGNIFICATION - .031740	
-A GROUP LENGTH-22.45MM (.883IN.)		-A GROUP LENGTH-23.62MM (.930IN.)		-A GROUP LENGTH-24.31MM (.957IN.)	
GROUP		GROUP		GROUP	
-5	-1	-5	-1	-5	-1
-4	2.0	-4	2.0	-4	2.0
-3	3.0	-3	3.0	-3	3.0
-2	4.0	-2	4.0	-2	4.0
-1	5.0	-1	5.0	-1	5.0
0	6.0	0	6.0	0	6.0
1	7.0	1	7.0	1	7.0
2	8.0	2	8.0	2	8.0
3	9.0	3	9.0	3	9.0
4	10.0	4	10.0	4	10.0
5	11.0	5	11.0	5	11.0
6	12.0	6	12.0	6	12.0
7	13.0	7	13.0	7	13.0
8	14.0	8	14.0	8	14.0
9	15.0	9	15.0	9	15.0
10	16.0	10	16.0	10	16.0
11	17.0	11	17.0	11	17.0
12	18.0	12	18.0	12	18.0
13	19.0	13	19.0	13	19.0
14	20.0	14	20.0	14	20.0
15	21.0	15	21.0	15	21.0
16	22.0	16	22.0	16	22.0
17	23.0	17	23.0	17	23.0
18	24.0	18	24.0	18	24.0
19	25.0	19	25.0	19	25.0
20	26.0	20	26.0	20	26.0
21	27.0	21	27.0	21	27.0
22	28.0	22	28.0	22	28.0
23	29.0	23	29.0	23	29.0
24	30.0	24	30.0	24	30.0
25	31.0	25	31.0	25	31.0
26	32.0	26	32.0	26	32.0
27	33.0	27	33.0	27	33.0
28	34.0	28	34.0	28	34.0
29	35.0	29	35.0	29	35.0
30	36.0	30	36.0	30	36.0

MAGNIFICATION - .032670		MAGNIFICATION - .033636		MAGNIFICATION - .034621	
-A GROUP LENGTH-25.42MM (.998IN.)		-A GROUP LENGTH-25.765MM (1.014IN.)		-A GROUP LENGTH-26.520MM (1.044IN.)	
GROUP		GROUP		GROUP	
-5	-1	-5	-1	-5	-1
-4	2.0	-4	2.0	-4	2.0
-3	3.0	-3	3.0	-3	3.0
-2	4.0	-2	4.0	-2	4.0
-1	5.0	-1	5.0	-1	5.0
0	6.0	0	6.0	0	6.0
1	7.0	1	7.0	1	7.0
2	8.0	2	8.0	2	8.0
3	9.0	3	9.0	3	9.0
4	10.0	4	10.0	4	10.0
5	11.0	5	11.0	5	11.0
6	12.0	6	12.0	6	12.0
7	13.0	7	13.0	7	13.0
8	14.0	8	14.0	8	14.0
9	15.0	9	15.0	9	15.0
10	16.0	10	16.0	10	16.0
11	17.0	11	17.0	11	17.0
12	18.0	12	18.0	12	18.0
13	19.0	13	19.0	13	19.0
14	20.0	14	20.0	14	20.0
15	21.0	15	21.0	15	21.0
16	22.0	16	22.0	16	22.0
17	23.0	17	23.0	17	23.0
18	24.0	18	24.0	18	24.0
19	25.0	19	25.0	19	25.0
20	26.0	20	26.0	20	26.0
21	27.0	21	27.0	21	27.0
22	28.0	22	28.0	22	28.0
23	29.0	23	29.0	23	29.0
24	30.0	24	30.0	24	30.0
25	31.0	25	31.0	25	31.0
26	32.0	26	32.0	26	32.0
27	33.0	27	33.0	27	33.0
28	34.0	28	34.0	28	34.0
29	35.0	29	35.0	29	35.0
30	36.0	30	36.0	30	36.0